General Information

Also Covers
U Deck HS 640 V

E²PROM Initialise & Service Position

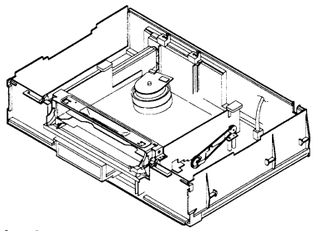
HOW TO INITIALIZE THE E2PROM
A replacement E²PROM is not initialized before shipping, so the E²PROM must be initialized when replaced.

Initialize the E²PROM by following the steps below.
1. Set the VCR to 'CLOCK SET' mode.
2. Push **COUNTER RESET** button on the remote hand unit for 8 seconds.
3. E²PROM initial setting is completed.

Service Position

Service Position

(A)



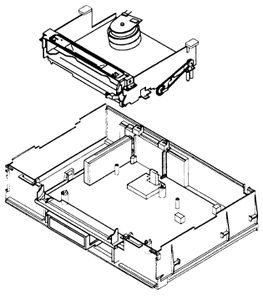
Service Item

- Worn parts on the deck (UPPER DRUM ASSY, PINCH ARM ASSY, A/C HEAD UNIT and FE HEAD.) can be replaced.
- Checks at test points may be made to isolate a problem to a specific circuit.

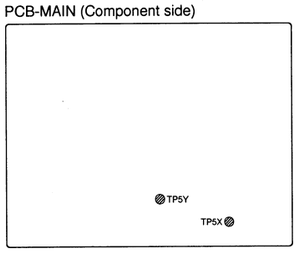
1. Remove the Top Cover and Front Panel. (Refer to Para. 1 and 2 of the DISASSEMBLY.)

Service Position

(B)



PCB-MAIN (Component side)



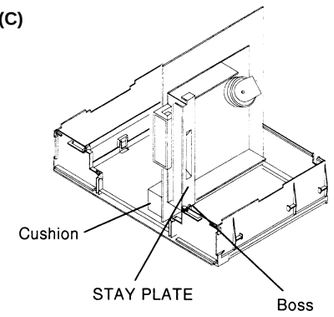
Service Item

- Parts on the deck can be replaced.
- Service can be executed with the EE picture displayed.

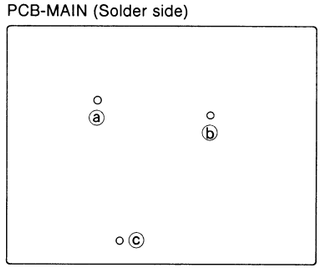
1. Remove the DECK ASSY. (Refer to Para. 4 of the DISASSEMBLY.)
2. Connect TP5X and TP5Y via diode (1SS252). TP5X Anode side TP5Y: Cathode side Note: Make this connection before turning the power on.

Service Position

(C)



PCB-MAIN (Solder side)



Service Item
- Operation can be checked in every mode.
- Parts on the copper side of the PCB-MAIN can be checked and replaced.

1. Remove the DECK ASSY, INSERT GUIDE and PCB-MAIN. (Refer to Para. 4 and 5 of the DISASSEMBLY and Para. 1 of the HOW TO EXECUTE CIRCUIT BOARD SERVICE.)
2. Install the three screws (a), (b) and (c) to secure the PCB-MAIN and DECK ASSY. Note: Check the connection of the MC connector.
3. Rotate the PCB-MAIN and DECK ASSY upward holding them in position.
4. Connect all connectors on PCB-MAIN.
5. Stand the DECK ASSY and the PCB-MAIN on the Base chassis so that the hole on the STAY PLATE (Take up side) of the DECK ASSY aligns with the boss of the Base chassis.
6. Fix the PCB-MAIN on the Base chassis, providing a cushion between them for secure installation.

Deck Operation Check

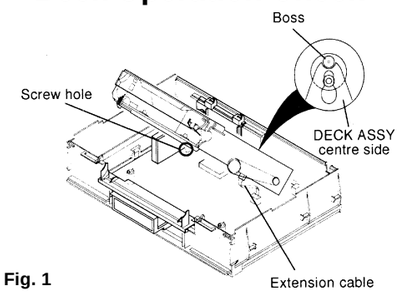


Fig. 1

PCB-MAIN (Component side)

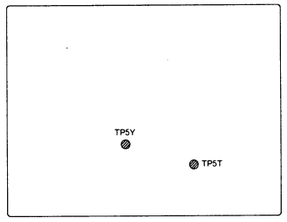


Fig. 2

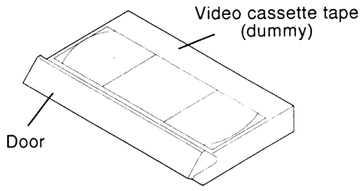


Fig. 3

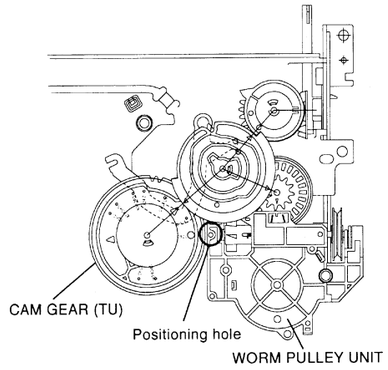


Fig. 4

Operation of the deck position and tape running systems can be checked according to the following method.

1. Unscrew all screws fastening the DECK ASSY and Shield Case.
2. Place the DECK ASSY on the Base Chassis so that the centre of the rear side aligns with the boss and that the rear side of the supply side aligns with the screw hole as shown in Fig. 1. Raise the front side of the DECK ASSY and hold it with a support.
   Note: The MODE DETECT SENSOR, START SENSOR, END SENSOR, REEL SENSOR and RECORD PROTECTION SENSOR cannot operate in this state. Parts on the DECK (LOADING BELT and REEL BELT) can be replaced.
3. Connect TP5Y and TP5T via diode (1SS252).
   TP5T: Anode side
   TP5Y: Cathode side
   Note: Connect them before plugging in the set.
4. Turn the power on.
5. Insert the video cassette tape.
   Note: This check may damage the cassette tape. Use a dummy cassette tape with a door or other tapes for check purpose only.
6. Press the CH-UP and CH-DOWN buttons on the PCB-MAIN to check the deck position. CH-UP button : Operation in the loading direction. CH-DOWN button: Operation in the unloading direction.
7. Connect the MC connector and the CAPSTAN MOTOR on the PCB-MAIN with the Extension cable (859C433080). Press the FF and REW buttons on the PCB-MAIN to check the operation of the tape running system.
   Note: Take care so that the two connectors of the Extension cable are attached in the same direction, without twisting the cable.
   FF button: Forward rotation is implemented
   REW button: Reverse rotation is implemented
   Example: Playback, REW/FF

1) Press the CH-UP or CH-DOWN button to align the character "**PR**" or "**FR**" of the CAM GEAR (TU) with the positioning hole of the WORM PULLEY UNIT shown in Fig. 4.
   "PR": Playback position
   "FR": REW/FF position
2) For fast forward operation check, press the **FF** button to make the CAPSTAN MOTOR rotate in the forward direction. For rewind operation check, press the **REW** button to make the CAPSTAN MOTOR rotate in the reverse direction.

Electrical Adjustments

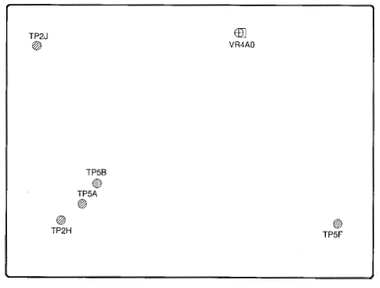
Perform only the alignments required. If proper equipment is not availabledo not attempt an alignment.

PRE-ADJUSTMENT SETTINGS
- Set the "COLOUR SYSTEM" to "PAL" mode in the MENU. (HS-640V(E), (G)/HS-640(Y) only)
- Set the "TAPE OPTIMIZER" to "OFF" mode in the MENU.
- Set the "BAND-OPTIMIERUNG" to "OFF" mode in the MENU. (HS-640V(G) only)
- Set the "RENTAL PB" to "OFF" position.

MEASURING EQUIPMENT
- Oscilloscope (10:1 probe unless 1:1 specified.)
- Frequency counter
- Electrical tools

LOCATIONS

PCB-MAIN (Component side) REAR



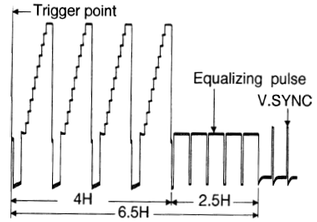
[Servo circuit]
1 Playback Switching Point

Adjustment purpose
Video switch over timing during playback.

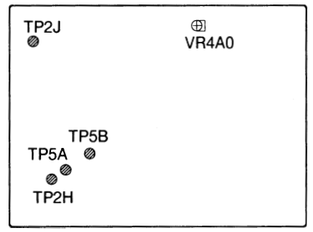
Symptom when incorrectly adjusted
Switching noise or jitter in the playback picture.

Measuring instrument and condition.		VCR set up condition	
Oscilloscope		Input signal	———
Test point	TP2J	Using tape	Alignment tape (PS2, stair step)
EXT trigger	TP2H	VCR condition	Playback
Measurement range	DIV 20mV TIM 50µs	Using Jig	———

1. Playback an alignment tape (PS2, stair step).
2. Short-circuit TP5A to TP5B. Confirm that the "D" displayed in Fluorescent Display flashes fast.
3. Observe the waveform at TP2J.
4. Set the oscilloscope's slope to (—).
5. Adjust VR4A0 so that the trigger point is located at 6.5±1.0H before the vertical synchronizing signal.



PCB-MAIN (Component side)



[Timer circuit]

2. Clock Frequency Correction

Adjustment purpose
To set the accuracy of clock.

Symptom when incorrectly adjusted
Poor clock accuracy.

Measuring instrument and condition.		VCR set up condition	
Frequency CVounter		Input signal	———
Test point	TP5F	Using tape	———
EXT trigger	———	VCR condition	POWER off
Measurement range	———	Using Jig	———

1. Set the VCR to POWER off. (With the tape ejected from VCR.)
2. Short-circuit TP5A to TP5B.
3. Observe the frequency at TP5F.
4. Be certain that the frequency is between 262.1000 262.1882kHz.
5. Use the number buttons on the remote hand unit to enter the last three digits of the frequency counter reading (262.1(a)(b)(c)kHz). (Confirm that the "." is not displayed in fluorescent display.) Enter the digits in (a)(b)(c) sequence.
6. Push the REC button on the remote hand unit. (Confirm that the "." is displayed in fluorescent display.)
7. Open-circuit TP5A to TP5B.

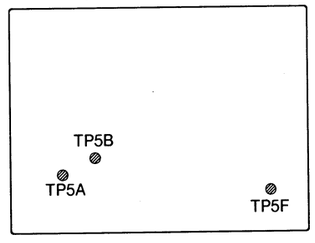
Mechanical Adjustments and Replacements

1.Cleaning the DECK
The following parts require cleaning whenever serviced to maintain satisfactory performance.

1-1 VIDEO HEAD

1. Clean the VIDEO HEADs by the following method. Dust and other foreign objects on the VIDEO HEADs disturb the normal playback picture. Dampen a VIDEO HEAD CLEANING CLOTH with alcohol. Hold the cloth against the DRUM and slowly turn the DRUM counterclockwise to clean.
   Note: Do not directly touch the HEAD attached to the UPPER DRUM ASSY. The HEAD is very hard but brittle to impact, especially in the vertical direction. Do not apply force in the vertical direction.

PCB-MAIN (Component side)



2. Allow residual alcohol to dry thoroughly before running a tape. Otherwise, the liquid may stick to and damage the tape.

1-2 Tape Transport
(Refer to Fig. 1-1, next page)
Clean the following parts of the Tape transport.

1. TENSION PIN
2. GUIDE POLE (SP)
3. FE HEAD
4. SLANT POLE (SP)
5. UPPER/LOWER DRUM ASSY
6. SLANT POLE (TU)
7. A/C HEAD
8. GUIDE POLE (TU)
9. CAPSTAN SHAFT
10. GUIDE PIN (TU)

Mechanical Adjustments and Replacements Cont'd

11. GUIDE ROLLER (SP)
12. GUIDE ROLLER (TU)
13. PINCH ROLLER

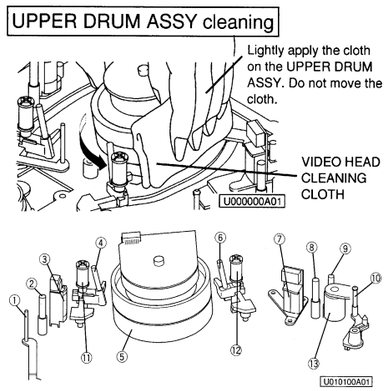

UPPER DRUM ASSY cleaning
Lightly apply the cloth on the UPPER DRUM ASSY. Do not move the cloth.
VIDEO HEAD CLEANING CLOTH
U000000A01
U010100A01

Fig. 1-1

1. Clean the tape transport using gauze dampened with alcohol, except the GUIDE ROLLER (SP), GUIDE ROLLER (TU) and PINCH ROLLER for which dry gauze should be used.
2. Allow residual alcohol to dry thoroughly before running a tape. Otherwise the liquid may stick to and damage the tape.

1-3 REEL DISK Drive System

1. Clean the REEL DISK braking surfaces and the REEL BELT.
2. Clean the REEL DISK drive system using gauze dampened with alcohol, except the REEL BELT for which dry gauze shall be used.
3. Allow residual alcohol to dry thoroughly before operation.

2. Replacement of Major Parts

2-1 GUIDE ARM (SP), CLEANING ARM, CLEANING ROLLER UNIT

Position the set normally.

(Removal)
1. Disconnect the lead from the FE HEAD, which is clamped on the GUIDE ARM (SP) shown in **Fig. 2-1-1.**

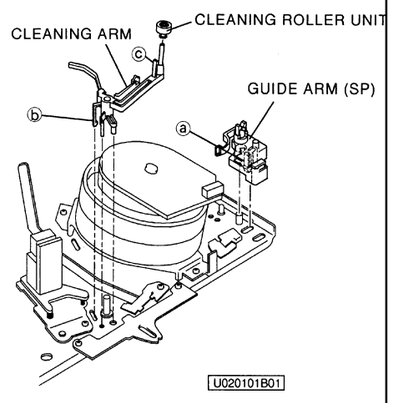


Fig. 2-1-1

2. Unfasten the catch (a) of the GUIDE ARM (SP) shown in Fig. 2-1-1 to remove the GUIDE ARM (SP).
3. Unfasten the catch (b) of the CLEANING ARM shown in Fig. 2-1-1 to remove the CLEANING ARM.
4. Unfasten the catch (c) of the CLEANING ARM shown in Fig. 2-1-1 to remove the CLEANING ROLLER UNIT from the CLEANING ARM.

(Installation)
1. Install the CLEANING ROLLER UNIT shown in Fig. 2-1-1 to the CLEANING ARM.
2. Install the CLEANING ARM shown in Fig. 2-1-1.
3. Install the GUIDE ARM (SP) shown in Fig. 2-1-1.
4. Connect the lead from the FE HEAD.

2-2 STAY PLATE

Position the set normally.
(Removal)

1. Unfasten the STAY PLATE fastening screw (a) shown in Fig. 2-2-1.
2. Raise the STAY PLATE in the direction shown by arrow (A) so that it stands completely in vertical as shown in Fig. 2-2-1. Remove the STAY PLATE in the direction shown by arrow (B).

(Installation)
1 Install the STAY PLATE shown in Fig. 2-2-1.

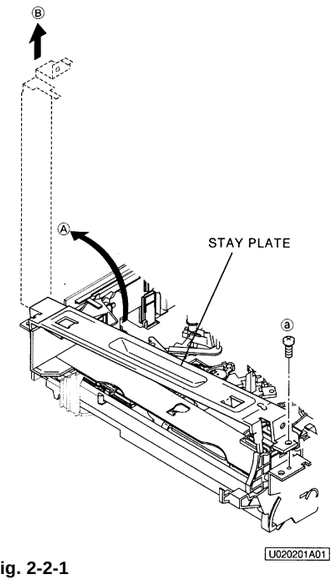


Fig. 2-2-1

2-3 BOTTOM UNIT

Position the set normally.

(Removal)
1. Remove the STAY PLATE. (Refer to Para. 2-2.)
2. Remove the BOTTOM UNIT in the direction shown by the arrow as shown in Fig. 2-3-1.

(Installation)
1. Move the part A of the BOTTOM UNIT in the direction shown by arrow (A) and hold it with your hand as shown in Fig. 2-3-2. (You can install the BOTTOM UNIT without holding the part A, if a cassette tape is loaded in the BOTTOM UNIT.)
2. Move the part B of the BOTTOM UNIT in the direction shown by arrow as shown in Fig. 2-3-2.
3. Install the BOTTOM UNIT so that its boss matches with the groove of the MAIN PLATE ASSY as shown in Fig. 2-3-3.
4. Install the STAY PLATE. (Refer to Para. 2-2.)

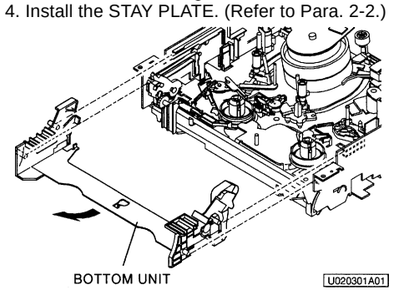


Fig. 2-3-1

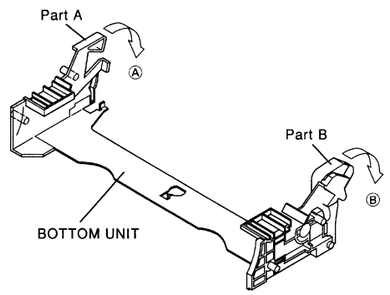


Fig. 2-3-2

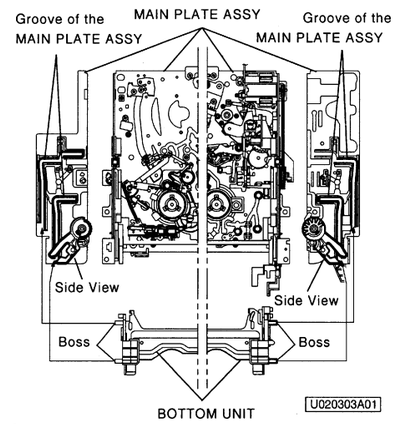


Fig. 2-3-3

2-4 A/C HEAD UNIT

Position the set normally.

(Removal)
1 Disconnect the lead connector of the A/C HEAD UNIT shown in Fig. 2-4-1.
2 Unscrew the two A/C HEAD UNIT fastening screws ((a) and (b) to remove the A/C HEAD UNIT.

(Installation)
1 Install the A/C HEAD UNIT shown in Fig. 2-4-1 Note: Never touch the part shown in Fig. 2-4-2. If it is stained, clean it with alcohol.
2 Connect the lead connector of the A/C HEAD UNIT shown in Fig. 2-4-1.
3 Perform "Adjustment of A/C HEAD" in Para. 3-3 and "Adjustment of Phase" in Para. 3-4 of "Interchangeability Adjustment of the Mechanism

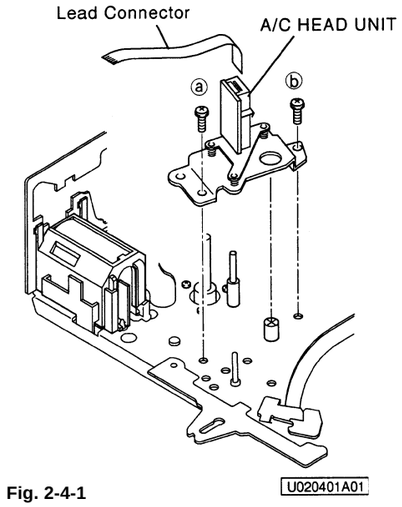


Fig. 2-4-1

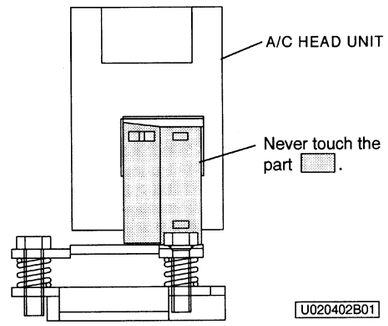


Fig. 2-4-2

2-5 FE HEAD

Position the set normally.

(Removal)
1 Disconnect the lead connector of the FE HEAD shown in Fig. 2-5-1.
2 Unscrew the FE HEAD fastening screw (®) to remove the FE HEAD.

(Installation)
1 Install the FE HEAD shown in Fig. 2-5-1.
Note: Never touch the part shown in Fig. 2-5-2. If it is stained, clean it with alcohol.
2 Connect the lead connector of the FE HEAD shown in Fig. 2-5-1.

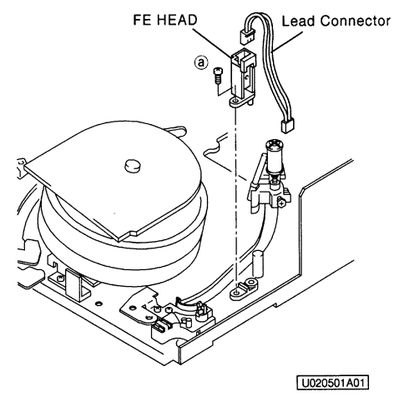


Fig. 2-5-1

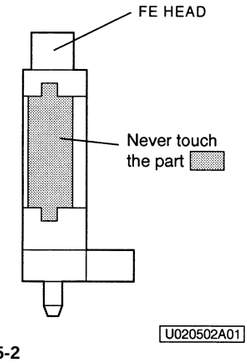


Fig. 2-5-2

2-6 SHUT LEVER UNIT

Position the set normally.
Before performing replacement in this paragraph, remove the following parts. Refer to the applicable paragraph for installation of each part.

- STAY PLATE (Para. 2-2)
- BOTTOM UNIT (Para. 2-3)

(Removal)
1 Unfasten the two catches ((a) and (b) of the SHUT LEVER UNIT shown in Fig. 2-6-1 to remove the SHUT LEVER UNIT.

(Installation)
1 Apply GREASE (MULTEMP SH-A) [859D055080] to the area specified in Fig. 2-6-1 on the new SHUT LEVER UNIT.
2 Install the SHUT LEVER UNIT shown in Fig. 2-6-1.
3 Insert the spring of the SHUT LEVER UNIT under groove of the MAIN PLATE ASS shown in Fig. 2-6-2.
4 Make sure that the SHUT LEVER UNIT returns in the direction shown by arrow © when it is moved in the direction shown by arrow

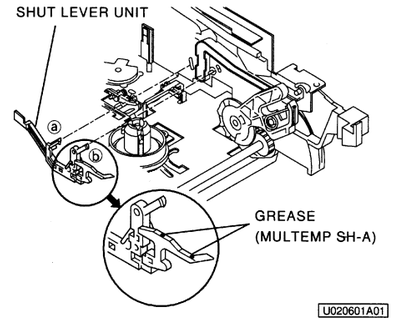


Fig. 2-6-1

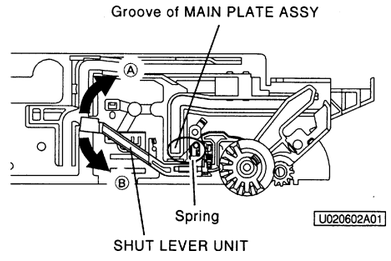


Fig. 2-6-2

2-7 LAMP GUIDE, MODE POSITION GUIDE

Position the set normally.

(Removal)
1 Unfasten the catch (a) of the MAIN PLATE ASSY shown in Fig. 2-7-1 to remove the LAMP GUIDE.
2 Unfasten the catch (b) of the MODE POSITION GUIDE shown in Fig. 2-7-1 to remove the MODE POSITION GUIDE.

(Installation)
1 Clean the part A of the MODE POSITION GUIDE shown in Fig. 2-7-2 with the VIDEO HEAD CLEANING CLOTH.
Note: Never use alcohol or equivalent solvent.
2 Install the MODE POSITION GUIDE shown in Fig. 2-7-1.
3 Clean the part B of the LAMP GUIDE shown in Fig. 2-7-2 with the VIDEO HEAD CLEANING CLOTH.
Note: Never use alcohol or equivalent solvent.
4 Install the LAMP GUIDE shown in Fig. 2-7-1.
5 After installing the LAMP GUIDE and MODE POSITION GUIDE, clean the surface of them with the VIDEO HEAD CLEANING CLOTH.
Note: Never use alcohol or equivalent solvent.

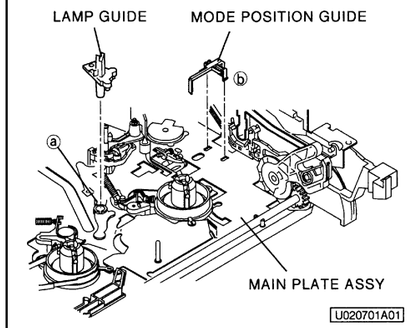


Fig. 2-7-1

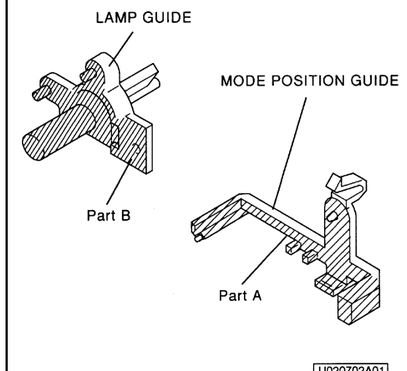


Fig. 2-7-2

2-8 TENSION SPRING, TENSION ARM, TENSION BELT UNIT

Position the set normally.

(Removal)
1 Remove the TENSION SPRING shown in Fig. 2-8-1.
2 Move the part A of the MAIN PLATE ASSY shown in Fig 2-8-3 in the direction shown by arrow with a minus driver, etc.
3 Unfasten the two catches (a) and (b) of the TENSION BELT UNIT shown in Fig. 2-8-1. Unfasten the catch (c) of the MAIN PLATE ASSY.

Mechanical Adjustments and Replacements Cont'd

Remove the TENSION BELT UNIT with the TENSION ARM attached.
4 Unfasten the two catches (d) and (e) of the TENSION BELT UNIT shown in Fig. 2-8-2 to remove the TENSION ARM.

(Installation)
1 Attach the TENSION ARM on the TENSION BELT UNIT shown in Fig. 2-8-2.
2 Fasten the TENSION BELT UNIT around the part shown in Fig. 2-8-3 of the REEL DISK (On SP side).
Note: Take care never to make GREASE or OIL adhere to the TENSION BELT UNIT during installation.
3 Move the part A of the spring of the TENSION LEVER UNIT shown in Fig. 2-8-4 in the direction shown by the arrow and install the TENSION ARM on the position shown in Fig. 2-8-4.
4 Move the part A of the MAIN PLATE ASSY in the opposite direction of arrow ® to let it enter the concave portion of the TENSION BELT UNIT as shown in Fig. 2-8-3 so that it points to the centre of the REEL DISK (On SP side).
5 Install the TENSION SPRING shown in Fig. 2-8-1.
6 Perform "Adjustment of BACK TENSION and TENSION PIN Position" in Para. 3-1 of "Interchangeability Adjustment of the Mechanism".

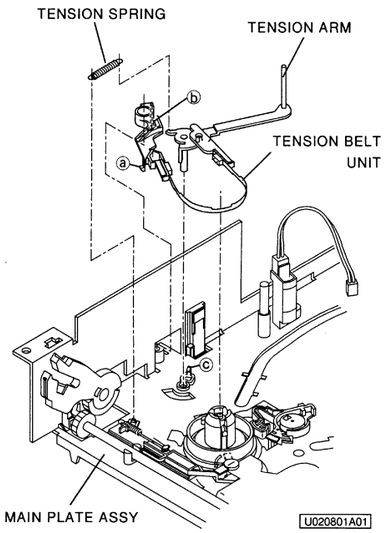


Fig. 2-8-1

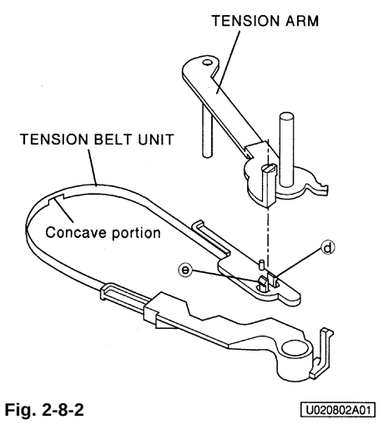


Fig. 2-8-2

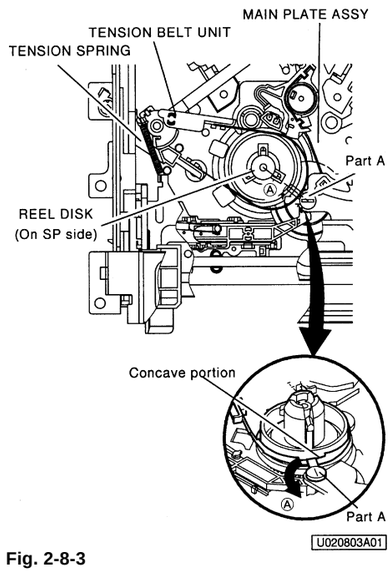


Fig. 2-8-3

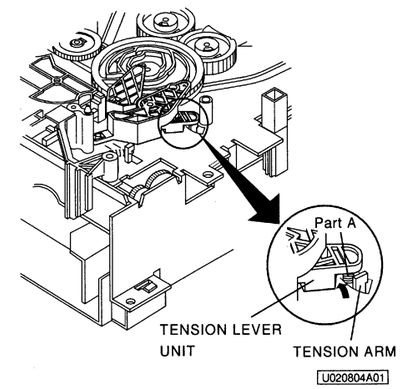


Fig. 2-8-4

2-9 BRAKE SPRING (for MAIN BRAKE (SP)), MAIN BRAKE (SP), BRAKE SPRING (for MAIN BRAKE (TU)), MAIN BRAKE (TU)

Position the set normally.

(Removal)
1 Remove the BRAKE SPRING (for MAIN BRAKE (SP)) shown in Fig. 2-9-1.
2 Unfasten the catch (a) of the MAIN BRAKE (SP) shown in Fig. 2-9-1 with tweezers, etc. to remove the MAIN BRAKE (SP).
3 Remove the BRAKE SPRING (for MAIN BRAKE (TU)) shown in Fig. 2-9-1.
4 Unfasten the catch (b) of the MAIN BRAKE (TU) shown in Fig. 2-9-1 to remove the MAIN BRAKE (TU).

(Installation)
1 Install the MAIN BRAKE (TU) shown in Fig. 2-9-1.
2 Install the BRAKE SPRING (for MAIN BRAKE (TU)) shown in Fig. 2-9-1.
3 Install the MAIN BRAKE (SP) shown in Fig. 2-9-1.
4 Install the BRAKE SPRING (for MAIN BRAKE (SP)) shown in Fig. 2-9-1.

2-10 REEL DISK (On SP side), REEL DISK (On TU side)

Position the set normally.

Before performing replacement in this paragraph, remove the following parts. Refer to the applicable paragraph for installation of each part.
• TENSION SPRING (Para. 2-8)
• TENSION ARM (Para. 2-8)
• TENSION BELT UNIT (Para. 2-8)

(Removal)
1 Move the MAIN BRAKE (SP) in the direction shown by arrow (B) hold it in that state. Remove the REEL DISK (On SP side) as shown in Fig. 2-10-1.
2 Move the part B in the direction shown by arrow (C) with a minus screw driver as shown in Fig. 2-10-1.
3 Move the BAKE MAIN (TU) in the direction shown by arrow (D) hold it in that state. Remove the REEL DISK (On TU side) as shown in Fig. 2-10-1.

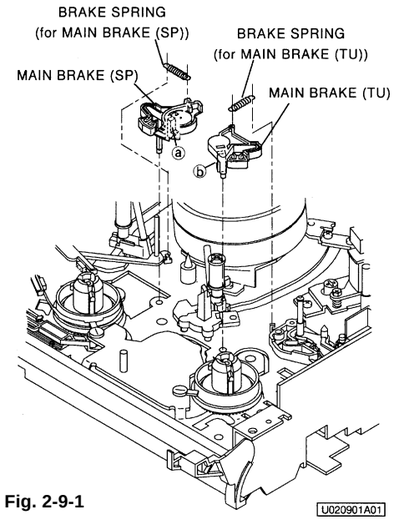


Fig. 2-9-1

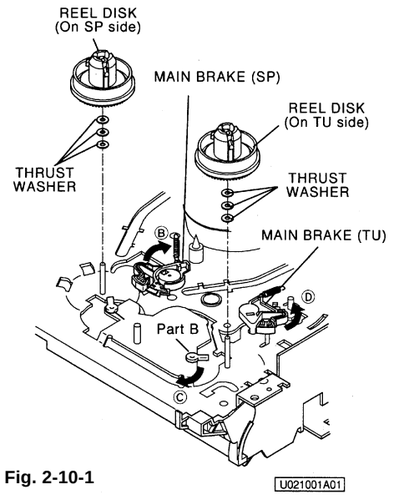


Fig. 2-10-1

(Installation)
1 Install the REEL DISK (On SP side) shown in Fig. 2-10-1.
2 Place the height adjustment jig [MASTER PLANE] (859C342020) shown in Fig. 2-10-2 in the reference position. (Place the MASTER PLANE so that the points A, B and C of the MAIN PLATE ASSY support it.)
3 Place the height adjustment jig [SQUARE] (859C433060) shown in Fig. 2-10-2 on the MASTER PLANE. Move it to the position shown in Fig. 2-10-3 to make sure that A can pass but B cannot pass under the REEL DISK (On SP side).
4 If the height of the REEL DISK (On SP side) is not correct, adjust it to the height specified in Item 3 by removing or adding the THRUST WASHER to be fixed to the shaft under the REEL DISK (On SP side).
• If it is high, remove THRUST WASHER.
• If it is low, add THRUST WASHER.
5 Install the TENSION BELT UNIT, TENSION ARM and TENSION SPRING. (Refer to Para. 2-8 for the installation method.)
6 Make sure that the REEL DISK (On SP side) shown in Fig. 2-10-1 cannot come off.
7 Install the REEL DISK (On TU side) shown in Fig. 2-10-1.
8 Place the height adjustment jig [MASTER PLANE] (859C342020) shown in Fig. 2-10-2 in the reference position. (Place the MASTER PLANE so that the points A, B and C of the MAIN PLATE ASSY support it.)
9 Place the height adjustment jig [SQUARE] (859C433060) shown in Fig. 2-1 0-2 on the MASTER PLANE. Move it to the position shown in Fig. 2-10-4 to make sure that A can pass but B cannot pass under the REEL DISK (On TU side).
10 If the height of the REEL DISK (On TU side) is not correct, adjust it to the height specified in Item 9 by remove or adding the THRUST WASHER to be fixed to the shaft under the REEL DISK (On TU side).
• If it is high, remove THRUST WASHER.
• If it is low, add THRUST WASHER.
11 Move the part of the MAIN PLATE ASSY in the opposite direction of arrow (C) as shown in Fig. 2-10-4 so that it points to the centre of the REEL DISK (On TU side).
12 Make sure that the REEL DISK (On TU side) shown in Fig. 2-10-1 cannot come off.

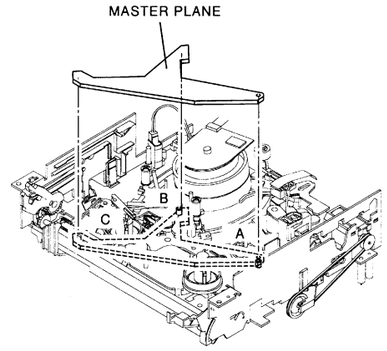


Fig. 2-10-2

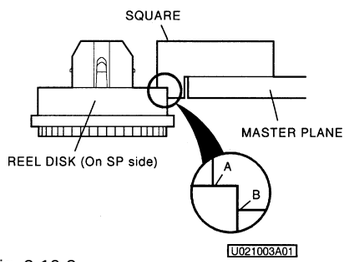


Fig. 2-10-3

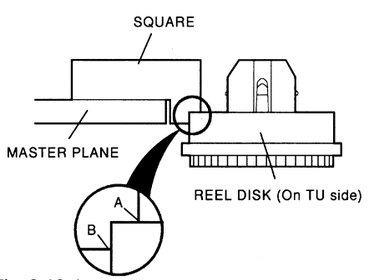


Fig. 2-10-4

2-11 LOADING BELT, LOADING MOTOR ASSY

Position the set normally.

(Removal)
1 Remove the LOADING BELT shown in Fig. 2-11-1.
2 Unfasten the two catches (A) and (B) of the LOADING MOTOR ASSY shown in Fig. 2-11-2 and the two catches (c) and (d) of it shown in Fig. 2-11-2 to remove the LOADING MOTOR ASSY.

(Installation)
1 Install the LOADING MOTOR ASSY shown in Fig. 2-11-2.
2 Fasten the LOADING BELT shown in Fig. 2-1 1-1.
Note: Take care never to make GREASE or OIL adhere to the LOADING BELT during installation.

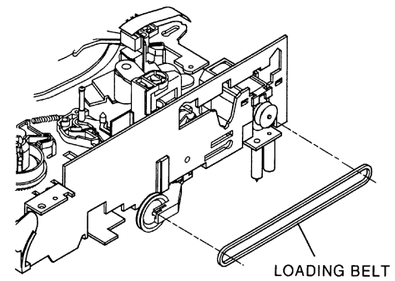


Fig. 2-11-1

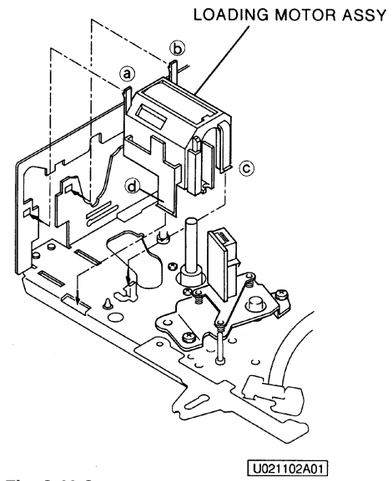


Fig. 2-11-2

2-12 PINCH ARM CAP, PINCH ARM UNIT, PINCH GEAR ARM 2, PINCH CAM HOLDER, PINCH CAM SPRING, PINCH CAM LEVER, PINCH RACK SLIDER, PINCH CAM GEAR

Position the set normally.

(Removal)
1 Unfasten the two catches (a) and (b) of the PINCH ARM CAP shown in Fig. 2-12-1 with the tweezers, etc. to remove the PINCH ARM CAP.
2 Move the PINCH ARM UNIT in the direction shown by arrow (A) to remove it as shown in Fig. 2-12-1.
3 Remove the PINCH GEAR ARM 2 shown in Fig. 2-12-1.
4 Remove the PINCH CAM SPRING shown in Fig. 2-12-1.
5 Remove the PINCH CAM LEVER shown in Fig. 2-12-1.
6 Unfasten the catch (c) of the PINCH RACK SLIDER shown in Fig. 2-12-1. Move the PINCH RACK SLIDER in the direction shown by arrow (B) to remove it.
7 Unscrew the screw (d) of the PINCH CAM HOLDER shown in Fig. 2-12-1 to remove the PINCH CAM HOLDER.
8 Remove the PINCH CAM GEAR shown in Fig. 2-12-1.

(Installation)
1 Apply GREASE (MULTEMP SH-A [859D055O80] to the area specified in Fig. 2-12-2 on the new PINCH CAM GEAR.

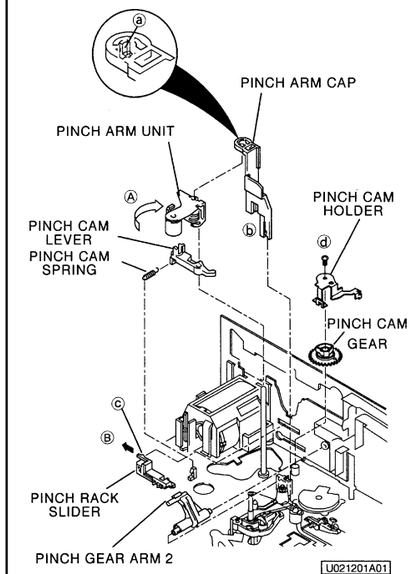


Fig. 2-12-1

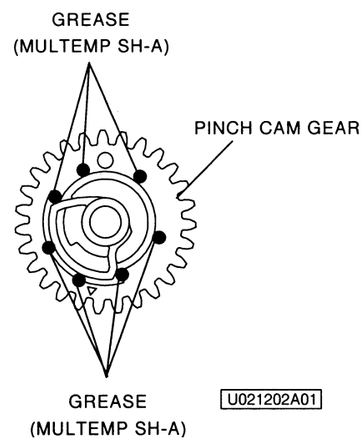


Fig. 2-12-2

2 Set the PINCH CAM GEAR so that the Δ mark on it matches with the Δ mark on the PINCH WORM GEAR as shown in Fig. 2-12-3 and install it.
3 Install the PINCH CAM HOLDER on the position shown in Fig. 2-12-4.
4 Move the PINCH RACK SLIDER in the direction shown by the arrow as shown in Fig. 2-12-5.
5 Make sure that the catch (a) of the PINCH

Mechanical Adjustments and Replacements Cont'd

RACK SLIDER enters the hole of the MAIN PLATE ASSY as shown in Fig. 2-12-5.
6 Install the PINCH CAM LEVER shown in Fig. 2-12-1.
7 Install the PINCH CAM SPRING shown in Fig. 2-12-1.

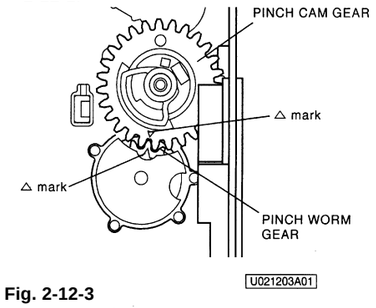


Fig. 2-12-3

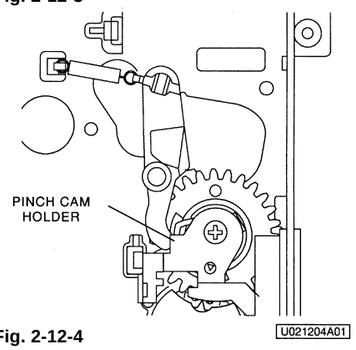


Fig. 2-12-4

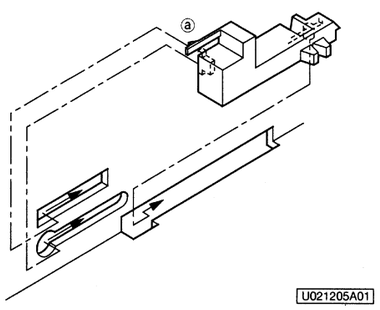


Fig. 2-12-5

8 Apply GREASE (MULTEMP SH-A) [859D055O80] to the area specified in Fig. 2-12-6 on the new PINCH GEAR ARM 2.
9 Install the PINCH GEAR ARM 2 shown in Fig. 2-12-1.
10 Move the PINCH ARM UNIT in the opposite direction of arrow (A) to install it as shown in Fig. 2-12-1.
11Install the PINCH ARM CAP shown in Fig. 2-12-1.

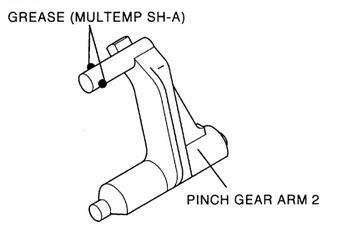


Fig. 2-12-6

2-13 GUIDE ARM ASSY (TU), GUIDE SPRING (TU), LOADING TG LEVER

Position the set normally.

(Removal)
1 Remove the NYLON NUT shown in Fig. 2-13-1 to remove the SL WASHER (a) the GUIDE ARM ASSY (TU) and GUIDE SPRING (TU).
2 Remove the CUT WASHER (b) fastening the LOADING TG LEVER shown in Fig. 2-13-1.
3 Unfasten the two catches (c) and (d) of the LOADING TG LEVER shown in Fig. 2-13-1 to remove the LOADING TG LEVER.

(Installation)
1 Apply GREASE (MULTEMP SH-A [859D055080] to the area specified in Fig. 2-13-2 on the new LOADING TG LEVER.
2 Install the LOADING TG LEVER shown in Fig. 2-13-1.
3 Install the CUT WASHER shown in Fig. 2-13-1 to fasten the LOADING TG LEVER.

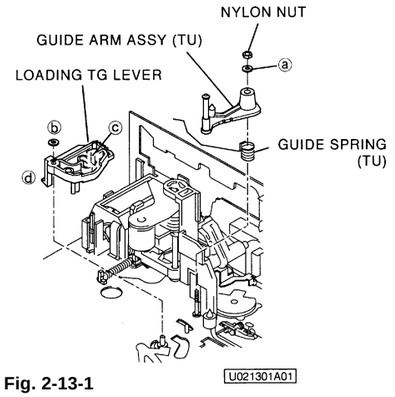


Fig. 2-13-1

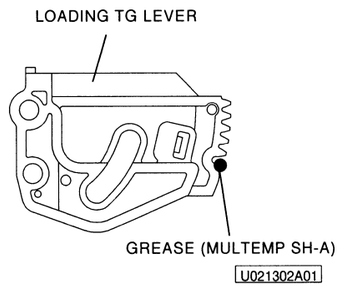


Fig. 2-13-2

4 Fix the GUIDE SPRING (TU) to the GUIDE ARM ASSY (TU) as shown in Fig. 2-13-3.
5 Fix the GUIDE ARM ASSY (TU) with the GUIDE SPRING (TU) attached shown in Fig. 2-13-1 to the shaft of the MAIN PLATE ASSY.
6 Install the GUIDE SPRING (TU) on the position shown in Fig. 2-13-4.

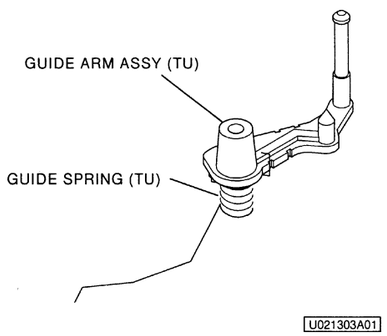


Fig. 2-13-3

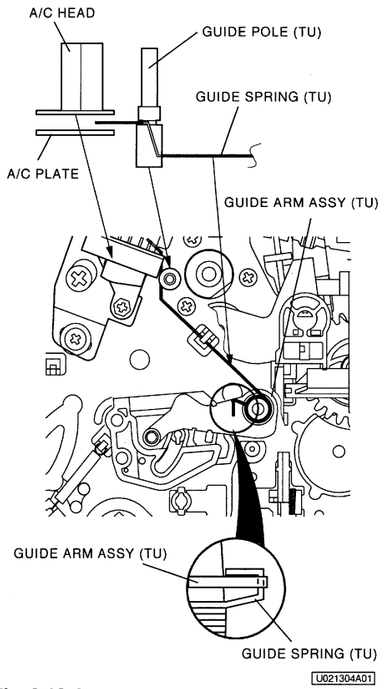


Fig. 2-13-4

7 Install the GUIDE ARM ASSY (TU) so that the first tooth of the gear of the GUIDE ARM ASSY (TU) shown in Fig. 2-13-5 matches with hole (A) of the LOADING TG LEVER.
8 Install the SL WASHER and NYLON NUT shown in Fig. 2-13-1.
9 Perform "Adjustment of GUIDE ARM ASSY (TU) Height" in Para. 3-5 of "Interchangeability Adjustment of the Mechanism".

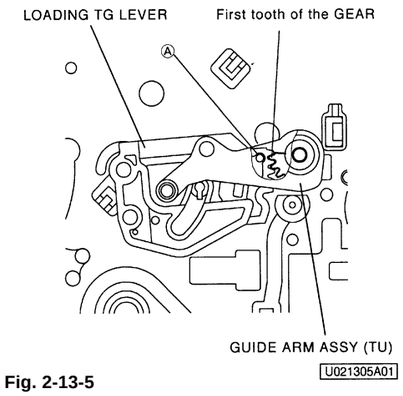


Fig. 2-13-5

2-14 REC SPRING, REC LEVER

Place the set upside down.

(Removal)
1 Remove the REC SPRING shown in Fig. 2-14-1.
2 Move the REC LEVER in the direction shown by arrow (A) until it strikes on the MAIN PLATE ASSY to remove it as shown in Fig. 2-14-1.

(Installation)
1 Insert the catch of the REC LEVER shown in Fig. 2-14-1 into the hole of the MAIN PLATE ASSY and install the REC LEVER.
2 Install the REC SPRING shown in Fig. 2-14-1.

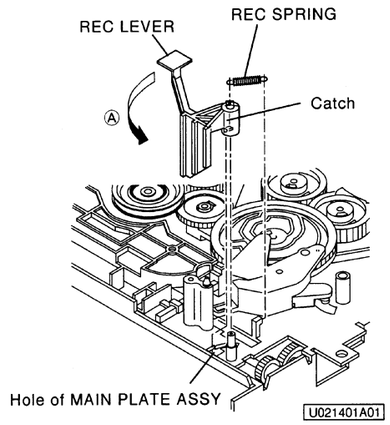


Fig. 2-14-1

2-15 REEL BELT, BELT PULLEY, SHIFT SPRING

Place the set upside down.

(Removal)
1 Remove the REEL BELT shown in Fig. 2-15-1.
2 Remove the CUT WASHER (a) fastening the BELT PULLEY shown in Fig. 2-15-1 to remove the BELT PULLEY.
3 Remove the SHIFT SPRING shown in Fig. 2-15-1.

(Installation)
1 Install the SHIFT SPRING shown in Fig. 2-15-1.
2 Fasten the BELT PULLEY shown in Fig. 2-15-1.
3 Install the CUT WASHER shown in Fig. 2-15-1 to fasten the BELT PULLEY.
4 Install the REEL BELT shown in Fig. 2-15-1.
Note: Take care never to make GREASE or OIL adhere to the REEL BELT during installation.

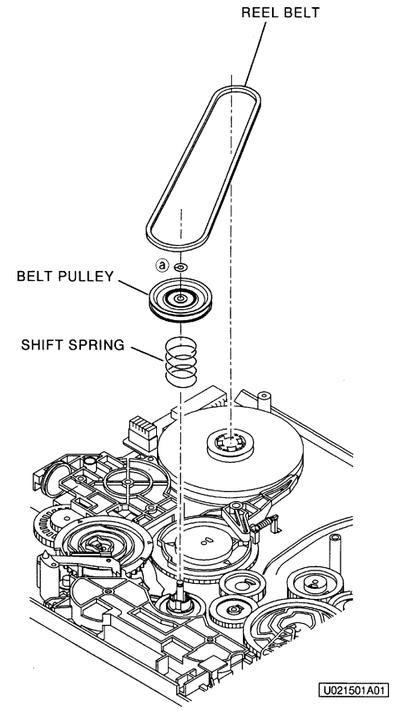


Fig. 2-15-1

2-16 CAPSTAN BRAKE SPRING, CAPSTAN BRAKE

Place the set upside down. Before performing replacement in this paragraph, remove the tot lowing part. Refer to the applicable paragraph for installation of the part.
• REEL BELT (Para. 2-15)

(Removal)
1 Remove the CAPSTAN BRAKE SPRING shown in Fig. 2-16-1.
2 Remove the CUT WASHER (a) fastening the CAPSTAN BRAKE shown in Fig. 2-16-1.
3 Unfasten the catch (b) on the surface of the CAPSTAN BRAKE shown in Fig. 2-16-1 with tweezers, etc. to remove the CAPSTAN BRAKE.

(Installation)
1 Install the CAPSTAN BRAKE shown in Fig. 2-16-1.
Note: Take care never to make GREASE or OIL adhere to the area specified in Fig. 2-16-1 during installation of the CAPSTAN BRAKE.
2 Install the CUT WASHER (a) shown in Fig. 2-16-1 to fasten the CAPSTAN BRAKE.
3 Install the CAPSTAN BRAKE SPRING shown in Fig. 2-16-1.

2-17 MODE HOLDER, REEL LOCK LEVER, MODE GEAR, F/L DRiVE GEAR, F/L DRIVE LEVER, WORM PULLEY UNIT, LOADING WORM GEAR

Place the set upside down.

(Removal)
1 Unfasten the catch (a) on the surface of the REEL LOCK LEVER shown in Fig. 2-17-1 with tweezers, etc. to remove the REEL LOCK LEVER.
2 Unscrew the MODE HOLDER fastening screw (b) shown in Fig. 2-17-1 to remove the MODE HOLDER.
3 Unfasten the catch (c) of the SNAP PIN shown in Fig. 2-17-1 with the tweezers, etc. to remove the SNAP PIN.
4 Unfasten the catch (d) on the surface of the MODE GEAR shown in Fig. 2-17-1 with tweezers, etc. to remove the MODE GEAR.
5 Remove the F/L DRIVE GEAR shown in Fig. 2-17-1 from the shaft of the MAIN PLATE ASSY.
6 Remove the F/L DRIVE LEVER shown in Fig. 2-17-1.

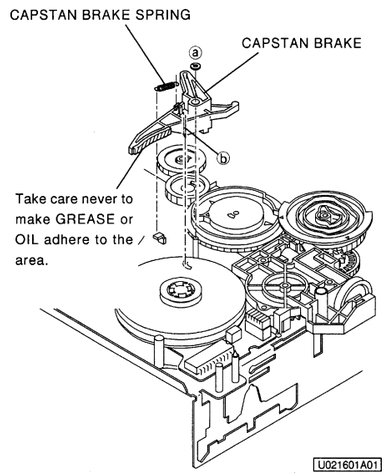


Fig. 2-16-1

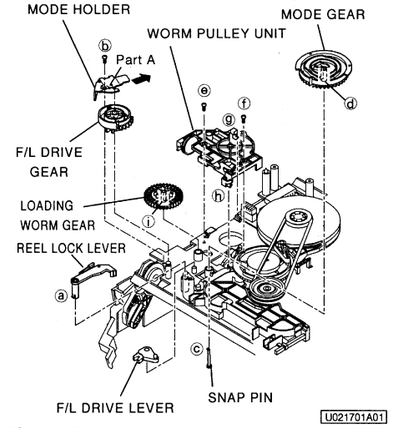


Fig. 2-17-1

7 Unscrew the two WORM PULLEY UNIT fastening screws (e) and (f) shown in Fig. 2-17-1.
8 Remove the LOADING BELT. (Refer to Para. 2-11 for the removal method.)
9 Unfasten the two catches (g) and (h) of the WORM PULLEY UNIT shown in Fig. 2-17-1 to remove the WORM PULLEY UNIT.
10 Unfasten the catch (i) on the surface of the LOADING WORM GEAR shown in Fig. 2-17-1 to remove the LOADING WORM GEAR.

(Installation)
1 Apply GREASE (MULTEMP SH-A) [859D055O80] to the area specified in Fig. 2-17-2 on the new LOADING WORM GEAR.
2 Install the LOADING WORM GEAR shown in Fig. 2-17-1.
3 Turn the WORM PULLEY shown in Fig. 2-17-3 SO that the round hole of the PINCH WORM GEAR matches with that of the WORM HOLDER.
4 Install the WORM PULLEY UNIT so that the △ mark on the LOADING WORM GEAR shown in Fig. 2-17-4 matches with the part A of it.
5 Fasten the LOADING BELT. (Refer to Para. 2-11.)
6 Install the F/L DRIVE LEVER shown in Fig. 2-17-1.

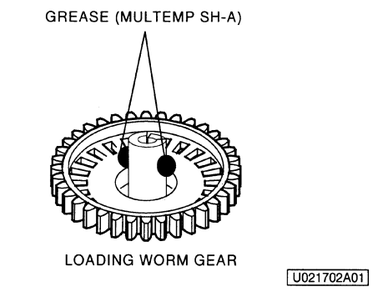


Fig. 2-17-2

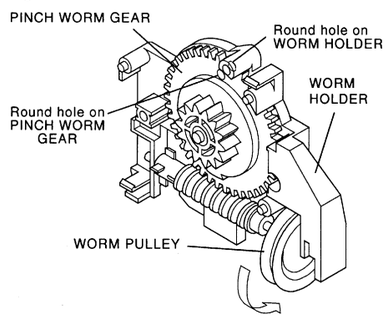


Fig. 2-17-3

Mechanical Adjustments and Replacements Cont'd

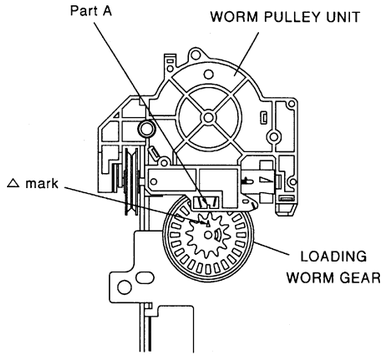
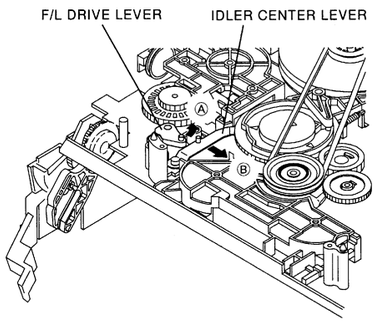


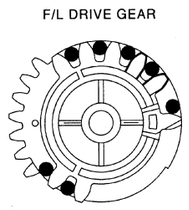
Fig. 2-17-4 U021704A01

7 Fully move the F/L DRIVE LEVER shown in Fig. 2-17-5 in the direction shown by arrow
8 Apply GREASE (MULTEMP SH-A) [859D055O80] to the area specified in Fig. 2-17-6 on the new F/L DRIVE GEAR.
9 Move the F/L ARM UNIT (TU) shown in Fig. 2-17-7 in the direction shown by arrow (A).



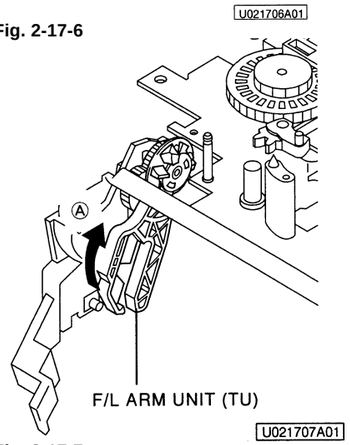
U021705A01

Fig. 2-17-5



Apply GREASE (MULTEM SH-A) to the area ●.

Fig. 2-17-6 U021706A01

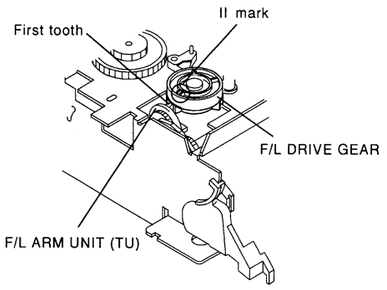


U021707A01

Fig. 2-17-7

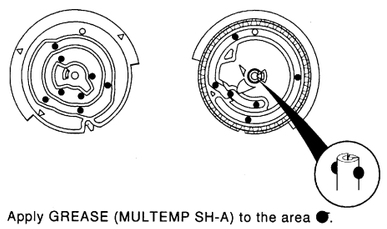
10 Install the F/L DRIVE GEAR so that the first tooth of the gear of the F/L ARM UNIT (TU) matches with the II mark on the F/L DRIVE GEAR as shown in Fig. 2-17-8.
11 Fully move the IDLER CENTER LEVER shown in Fig. 2-17-5 in the direction shown by arrow (B).
12 Apply GREASE (MULTEMP SH-A) [859D055O80] to the area shown in Fig. 2-17-9 on the new MODE GEAR.
13 Install the MODE GEAR shown in Fig. 2-17-10 so that;
- A mark on the part A of the MODE GEAR matches with A mark on the part B of the CAM GEAR (TU),
- A mark on the part C of the MODE GEAR points to the centre of the LOADING WORM GEAR, and
- A mark on the part D of the MODE GEAR matches with the 0 mark on the part E of the F/L DRIVE GEAR.

14 Make sure that the A mark on the PINCH WORM GEAR shown in Fig. 2-12-3 matches with the A mark on the PINCH CAM GEAR.
15 Push the SNAP PIN shown in Fig. 2-17-1 into the centre hole of the MODE GEAR from the surface to install it.
16 Move the MODE HOLDER shown in Fig. 2-17-1 in the direction shown by the arrow so that the part A of it is fixed to the shaft of the MAIN PLATE ASSY and install it.



U021708A01

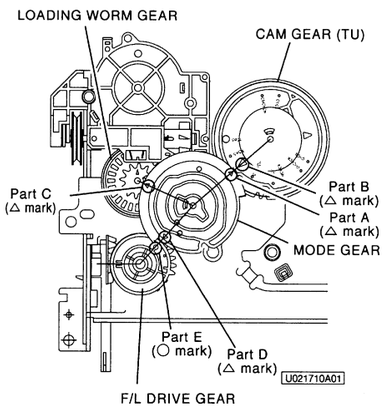
Fig. 2-17-8



Apply GREASE (MULTEMP SH-A) to the area ●.

U021709A01

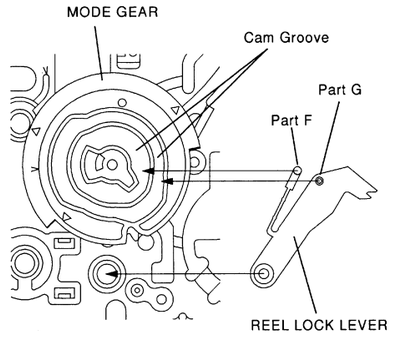
Fig. 2-17-9



U021710A01

Fig. 2-17-10

17 Install the REEL LOCK LEVER so that the pins on the parts F and G of the REEL LOCK LEVER shown in Fig. 2-17-11 enter the cam groove of the MODE GEAR.



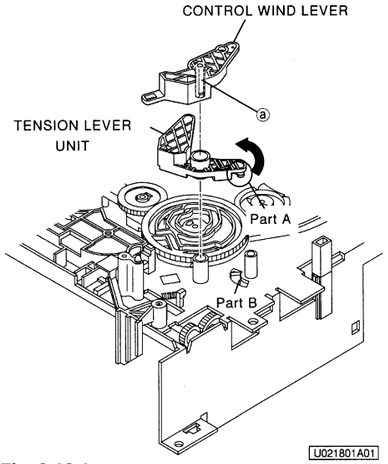
U021711A01

Fig. 2-17-11

2-18 CONTROL WIND LEVER, TENSION LEVER UNIT

Place the set upside down.

(Removal)
1 Unfasten the catch (a) on the surface of the CONTROL WIND LEVER shown in Fig. 2-18-1 with tweezers, etc. to remove the CONTROL WIND LEVER.
2 Remove the TENSION LEVER UNIT shown in Fig. 2-18-1.

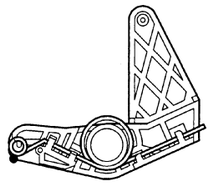


U021801A01

Fig. 2-18-1

(Installation)
1 Apply GREASE (MULTEMP SH-A) [859D055O80] to the area specified in Fig. 2-18-2 on the new TENSION LEVER UNIT.
2 Install the TENSION LEVER UNIT shown in Fig. 2-18-1 with taking care of the following.
- Make the pin on the part A of the TENSION LEVER UNIT shown in Fig. 2-18-3 enter the cam groove on the CAM GEAR (SP).
- Move the part A of the spring of the TENSION LEVER UNIT shown in Fig. 2-18-1 in the direction shown by the arrow. Install the TENSION LEVER UNIT so that the part A of the spring is hooked to the part B of the TENSION ARM.

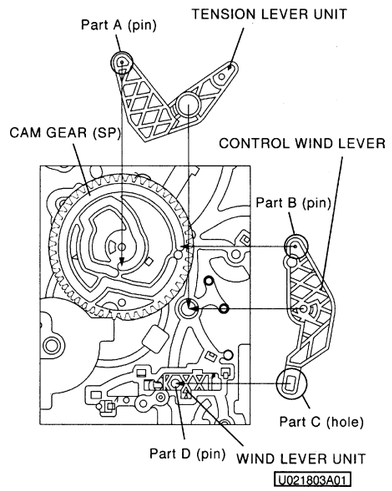
3 Apply GREASE (MULTEMP SH-A) [859D055O80] to the area specified in Fig. 2-18-4 on the new CONTROL WIND LEVER.
4 Install the CONTROL WIND LEVER so that the pin on the part B on the CONTROL WIND LEVER shown in Fig. 2-18-3 enters the cam groove of the CAM GEAR (SP) and that the pin of the part D of the WIND LEVER UNIT enters the hole of the part C on the CONTROL WIND LEVER.



Apply GREASE (MULTEMP SH-A) to the area ●.

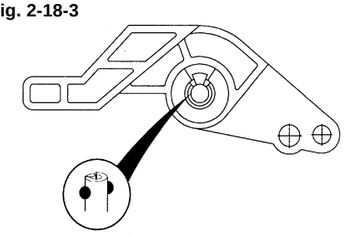
U021802A01

Fig. 2-18-2



U021803A01

Fig. 2-18-3



Apply GREASE (MULTEMP SH-A) to the area ●.

U021804A01

Fig. 2-18-4

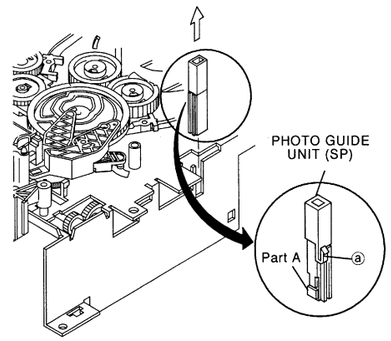
2-19 PHOTO GUIDE UNIT (SP), PHOTO GUIDE UNIT (TU)

Place the set upside down.
Before performing replacement in this paragraph, remove the following parts. Refer to the applicable paragraph for installation of each part.

- LOADING BELT (Para. 2-11)
- MODE HOLDER (Para. 2-17)
- REEL LOCK LEVER (Para. 2-17)
- MODE GEAR (Para. 2-17)
- WORM PULLEY UNIT (Para. 2-17)

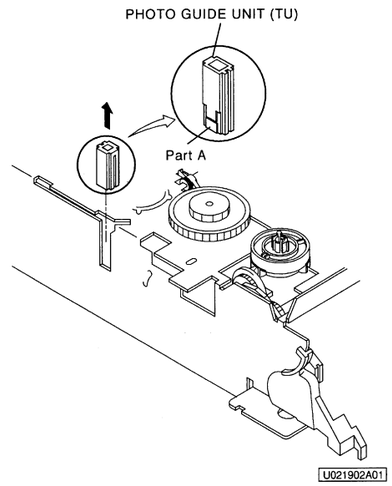
(Removal)
1 Unfasten the catch (a) of the PHOTO GUIDE UNIT (SP) shown in Fig. 2-19-1 with tweezers, etc. and remove the PHOTO GUIDE UNIT (SP) in the direction shown by the arrow.
2 Remove the PHOTO GUIDE UNIT (TU) shown in Fig. 2-19-2 in the direction shown by the arrow.

(Installation)
1 Push the PHOTO GUIDE UNIT (TU) into the DECK to the bottom, with the part A shown in Fig. 2-19-2 toward the inside of DECK.
Note: Never touch the transparent part of the PHOTO GUIDE UNIT (TU).
2 Push the PHOTO GUIDE UNIT (SP) into the DECK so that the catch (a) is hooked, with the part A shown in Fig. 2-19-1 toward the inside of DECK.
Note: Never touch the transparent part of the PHOTO GUIDE UNIT (SP).



U021901A01

Fig. 2-19-1



U021902A01

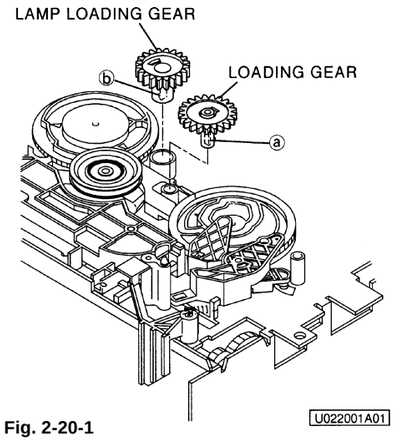
Fig. 2-19-2

2-20 LOADING GEAR, LAMP LOADING GEAR

Place the set upside down.
Before performing replacement in this paragraph, remove the following parts. Refer to the applicable paragraph for installation of each part.
- LAMP GUIDE (Para. 2-7)
- REEL BELT (Para. 2-15)

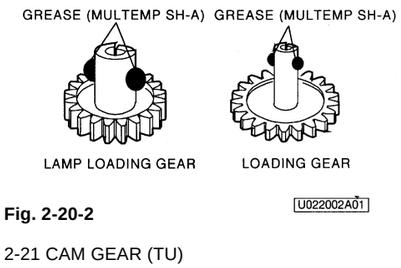
(Removal)
1 Unfasten the catch (a) on the surface of the LOADING GEAR shown in Fig. 2-20-1 with tweezers, etc. to remove the LOADING GEAR.
2 Unfasten the catch (b) on the surface of the LAMP LOADING GEAR shown in Fig. 2-20-1 with tweezers, etc. to remove the LAMP LOADING GEAR.

(Installation)
1 Apply GREASE (MULTEMP SH-A) [859D055O80] to the area specified in Fig. 2-20-2 on the new LAMP LOADING GEAR.
2 Install the LAMP LOADING GEAR shown in Fig. 2-20-1.
3 Apply GREASE (MULTEMP SH-A) [859D055O80] to the area specified in Fig. 2-20-2 on the new LOADING GEAR.
4 Install the LOADING GEAR shown in Fig. 2-20-1.



U022001A01

Fig. 2-20-1



U022002A01

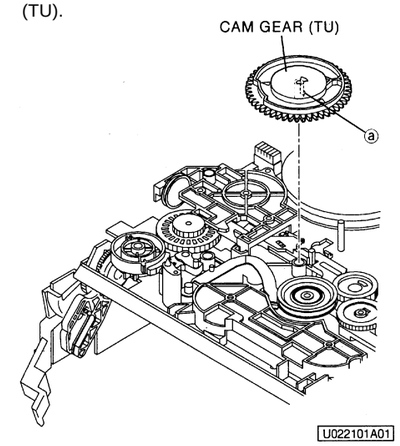
Fig. 2-20-2

2-21 CAM GEAR (TU)

Place the set upside down.
Before performing replacement in this paragraph, remove the following parts. Refer to the applicable paragraph for installation of each part.

- LOADING BELT (Para. 2-11)
- REEL BELT (Para. 2-15)
- CAPSTAN BRAKE SPRING (Para. 2-16)
- CAPSTAN BRAKE (Para. 2-16)
- MODE HOLDER (Para. 2-17)
- REEL LOCK LEVER (Para. 2-17)
- MODE GEAR (Para. 2-17)

(Removal)
1 Unfasten the catch (a) on the surface of the CAM GEAR (TU) shown in Fig. 2-21-1 with tweezers, etc. to remove the CAM GEAR (TU).



U022101A01

Fig. 2-21-1

Mechanical Adjustments and Replacements Cont'd

(Installation)
1 Apply GREASE (MULTEMP SH-A) [859D055O80] to the area specified in Fig. 2-21-2 on the new CAM GEAR (TU).
2 Set the CAM GEAR (SP) shown in Fig. 2-21-3 so that the ∆ mark on the part A of it points to the centre of the LOADING GEAR.
3 Install the CAM GEAR (TU) shown in Fig. 2-21-3 so that the ∆ mark on the part B of it points to the centre of the LAMP LOADING GEAR.

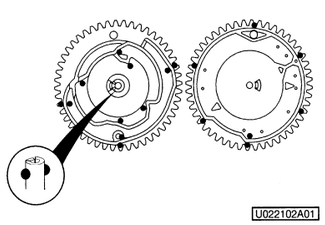


Fig. 2-21-2

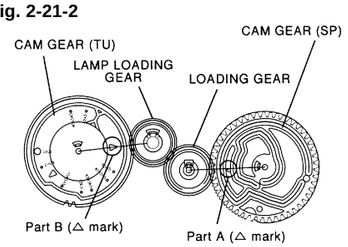


Fig. 2-21-3

2-22 PHOTO UNIT, REEL GEAR UNIT (TU), REEL GEAR UNIT (SP)

Place the set upside down.

(Removal)
1 Move the REC LEVER shown in Fig. 2-14-1 in the direction shown by arrow (A). Unfasten the two catches (a) and (b) of the PHOTO UNIT and the two catches (c) and (d) of the MAIN PLATE ASSY shown in Fig. 2-22-1 to remove the PHOTO UNIT.
2 Remove the REEL GEAR UNIT (TU) shown in Fig. 2-22-1.
3 Remove the REEL GEAR UNIT (SP) shown in Fig. 2-22-1.

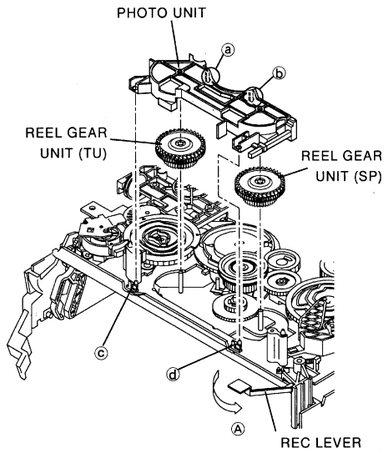


Fig. 2-22-1

(Installation)
1 Apply OIL (FLOIL 948P) [859D154O20] to the shaft shown in Fig. 2-22-2 in which the REEL GEAR UNIT (SP) of the ASSY MAIN PLATE is to enter.
2 Install the REEL GEAR UNIT (SP) shown in Fig. 2-22-2.
Note: Make sure the colour of the spring according to the table in Fig. 2-22-2 in installing the REEL GEAR UNIT (SP).
3 Apply 6lL (FLOIL 948P) [859D154O20] to the shaft shown in Fig. 2-22-2 in which the REEL GEAR UNIT (TU) of the MAIN PLATE ASSY is to enter.
4 Install the REEL GEAR UNIT (TU) shown in Fig. 2-22-1.
Note: Make sure the colour of the spring according to the table in Fig. 2-22-2 in installing the REEL GEAR UNIT (TU).
5 Apply a small quantity of OIL (FLOIL 948P) [859D154O20] to the area specified in Fig. 2-22-3 on the new PHOTO UNIT.
6 Install the PHOTO UNIT shown in Fig. 2-22-1.

Part Name	Colour of Spring
REEL GEAR UNIT (SP)	Gold
REEL GEAR UNIT (TU)	Silver

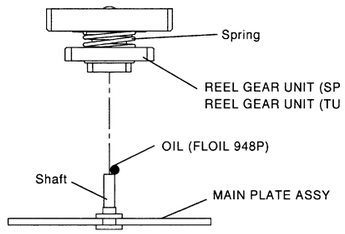


Fig. 2-22-2

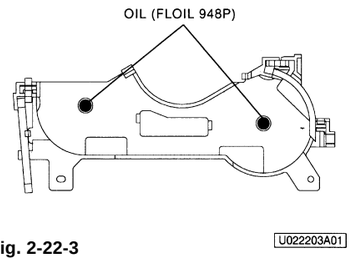


Fig. 2-22-3

2-23 IDLER CENTER LEVER

Place the set upside down.
Before performing replacement in this paragraph, remove the following parts. Refer to the applicable paragraph for installation of each part.

• LOADING BELT (Para. 2-11)
• REEL BELT (Para. 2-15)
• CAPSTAN BRAKE SPRING (Para. 2-16)
• CAPSTAN BRAKE (Para. 2-16)
• MODE HOLDER (Para. 2-17)
• REEL LOCK LEVER (Para. 2-17)
• MODE GEAR (Para. 2-17)
• CAM GEAR (TU) (Para. 2-21)
• PHOTO UNIT (Para. 2-22)

(Removal)
1 Remove the IDLER CENTER LEVER shown in Fig. 2-23-1.

(Installation)
1 Insert the part A of the IDLER CENTER LEVER shown in Fig. 2-23-2 into the part B of the IDLER UNIT to install the IDLER CENTER LEVER.

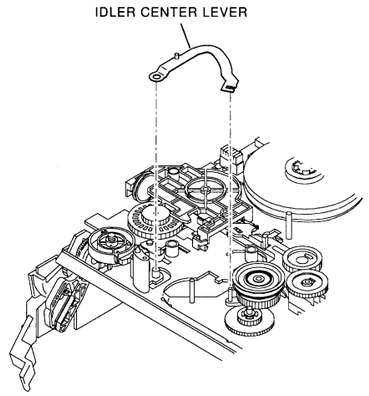


Fig. 2-23-1

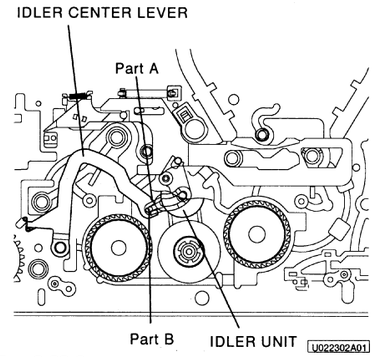


Fig. 2-23-2

2-24 PULLEY GEAR, IDLER UNIT

Place the set upside down.
Before performing replacement in this paragraph, remove the following parts. Refer to the applicable paragraph for installation of each part.

• LOADING BELT (Para. 2-11)
• REEL BELT (Para. 2-15)
• CAPSTAN BRAKE SPRING (Para. 2-16)
• CAPSTAN BRAKE (Para. 2-16)
• MODE HOLDER (Para. 2-17)
• REEL LOCK LEVER (Para. 2-17)
• MODE GEAR (Para. 2-17)
• CAM GEAR (TU) (Para. 2-21)
• PHOTO UNIT (Para. 2-22)
• IDLER CENTER LEVER (Para. 2-23)

(Removal)
1 Remove the PULLEY GEAR shown in Fig. 2-24-1.
2 Remove the IDLER UNIT shown in Fig. 2-24-1.

(Installation)
1 Apply OIL (FLOIL 948P) [859D154O20] to the shaft shown in Fig. 2-24-1 in which the IDLER UNIT is to enter.
2 Apply OIL (FLOIL 948P) [859D154O20] to the area specified in Fig. 2-24-1 on the new IDLER UNIT.
3 Install the IDLER UNIT shown in Fig. 2-24-1.
4 Install the PULLEY GEAR shown in Fig. 2-24-1.

2-25 F/L ARM UNIT (SP)

Position the set normally.
Before performing replacement in this paragraph, remove the following parts. Refer to the applicable paragraph for installation of each part.

• STAY PLATE (Para. 2-2)
• BOTTOM UNIT (Para. 2-3)

(Removal)
1 Fully move the F/L ARM UNIT (SP) in the direction shown by arrow (A) as shown in Fig. 2-25-1.
2 Unfasten the catch (a) of the F/L ARM UNIT (SP) shown in Fig. 2-25-1 to remove the F/L ARM UNIT (SP).

(Installation)
1 Fully move the F/L ARM UNIT (TU) in the direction shown by arrow (A) as shown in Fig. 2-26-1.
2 Install the F/L ARM UNIT (SP) so that the gear of the F/L ARM UNIT (SP) and that of the SYNC GEAR ASSY are engaged as shown in

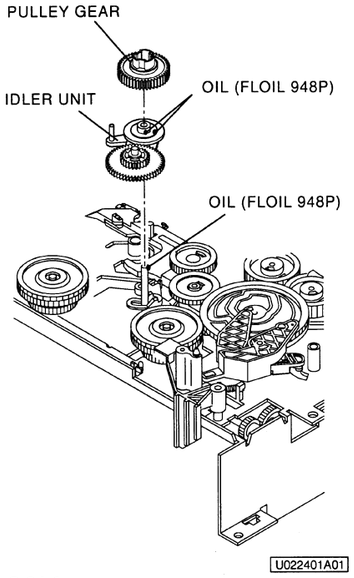


Fig. 2-24-1

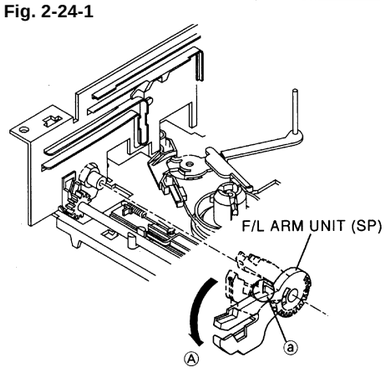


Fig. 2-25-1

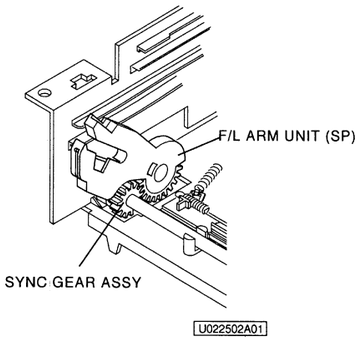


Fig. 2-25-2

2-26 F/L ARM UNIT (TU)

Position the set normally.
Before performing replacement in this paragraph, remove the following parts. Refer to the applicable paragraph for installation of each part.

• STAY PLATE (Para. 2-2)
• BOTTOM UNIT (Para. 2-3)
• LOADING BELT (Para. 2-11)
• MODE HOLDER (Para. 2-17)
• REEL LOCK LEVER (Para. 2-17)
• MODE GEAR (Para. 2-17)
• F/L DRIVE GEAR (Para. 2-17)
• F/L DRIVE LEVER (Para. 2-17)

(Removal)
1 Fully move the F/L ARM UNIT (TU) in the direction shown by arrow (A) as shown in Fig. 2-26-1.
2 Unfasten the catch (a) of the F/L ARM UNIT (TU) shown in Fig. 2-26-1 to remove the F/L ARM UNIT (TU).

(Installation)
1 Fully move the F/L ARM UNIT (SP) shown in Fig. 2-25-1 in the direction shown by arrow
2 Install the F/L ARM UNIT (TU) in the position shown in Fig. 2-26-2.

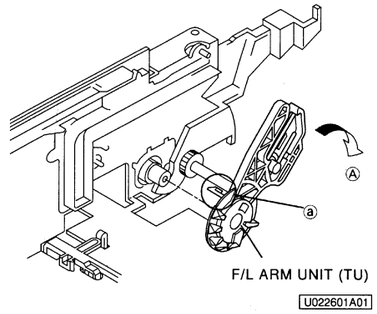


Fig. 2-26-1

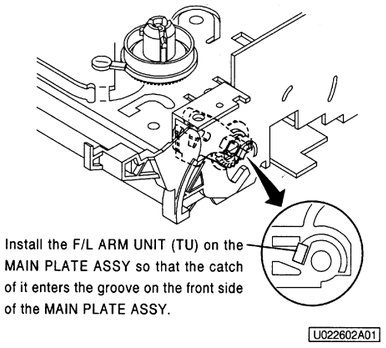

Install the F/L ARM UNIT (TU) on the MAIN PLATE ASSY so that the catch of it enters the groove on the front side of the MAIN PLATE ASSY.
U022602A01

Fig. 2-26-2

2-27 SYNC GEAR ASSY

Position the set normally.
Before performing replacement in this paragraph, remove the following parts. Refer to the applicable paragraph for installation of each part.

• STAY PLATE (Para. 2-2)
• BOTTOM UNIT (Para. 2-3)
• LOADING BELT (Para. 2-11)
• MODE HOLDER (Para. 2-17)
• REEL LOCK LEVER (Para. 2-17)
• MODE GEAR (Para. 2-17)
• F/L DRIVE GEAR (Para. 2-17)
• F/L ARM UNIT (SP) (Para. 2-25)
• F/L ARM UNIT (TU) (Para. 2-26)

(Removal)
1 Unfasten the catch (a) of the MAIN PLATE ASSY as shown in Fig. 2-27-1. Move the SYNC GEAR ASSY in the direction shown by the arrow (A) to remove it.

(Installation)
1 Move the SYNC GEAR ASSY shown in Fig. 2-27-1 in the opposite direction against the arrow (A) to install it.

2-28 F/L DOOR ARM

Position the set normally.
Before performing replacement in this paragraph, remove the following parts. Refer to the applicable paragraph for installation of each part.

• STAY PLATE (Para. 2-2)
• BOTTOM UNIT (Para. 2-3)
• LOADING BELT (Para. 2-11)
• MODE HOLDER (Para. 2-17)
• REEL LOCK LEVER (Para. 2-17)
• MODE GEAR (Para. 2-17)
• F/L DRIVE GEAR (Para. 2-17)
• F/L ARM UNIT (SP) (Para. 2-25)
• F/L ARM UNIT (TU) (Para. 2-26)
• SYNC GEAR ASSY (Para. 2-27)

(Removal)
1 Remove the F/L DOOR ARM shown in Fig. 2-28-1.

(Installation)
1 Install the F/L DOOR ARM shown in Fig. 2-28-1.

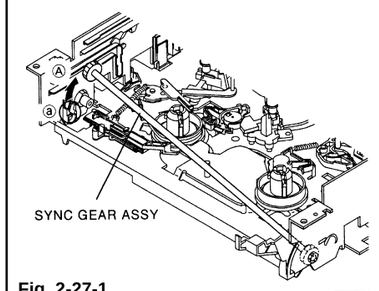


Fig. 2-27-1

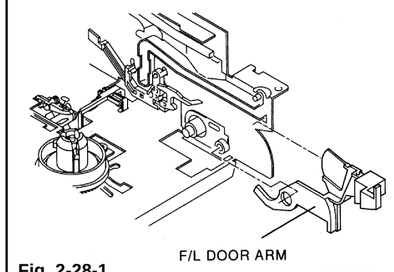


Fig. 2-28-1

2-29 WIND LEVER UNIT

Position the set normally.
Before performing replacement in this paragraph, remove the following parts. Refer to the applicable paragraph for installation of each part.

• STAY PLATE (Para. 2-2)
• BOTTOM UNIT (Para. 2-3)
• CONTROL WIND LEVER (Para. 2-18)

(Removal)
1 Move the WIND LEVER UNIT in the direction shown by the arrow to remove it as shown in Fig. 2-29-1.

Mechanical Adjustments and Replacements Cont'd

(Installation)
1 Set the WIND LEVER UNIT so that each of three notches (A) (B) and (C) on it respectively matches with the corresponding catch (a) (b) and (c) of the MAIN PLATE ASSY as shown in Fig. 2-29-1. Move the WIND LEVER UNIT in the opposite direction to the arrow to install it.

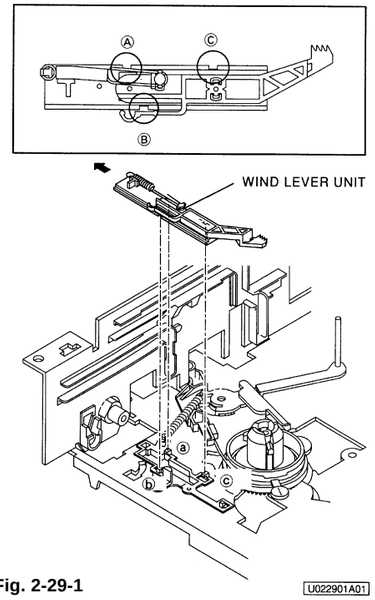


Fig. 2-29-1 U022901A01

2-30 LOADING LOCK SPRING, LOADING LOCK LEVER

Position the set normally.
Before performing replacement in this paragraph, remove the following parts. Refer to the applicable paragraph for installation of each part.

- MODE POSITION GUIDE (Para. 2-7)
- LOADING BELT (Para. 2-11)
- MODE HOLDER (Para. 2-17)
- REEL LOCK LEVER (Para. 2-17)
- MODE GEAR (Para. 2-17)
- WORM PULLEY UNIT (Pars. 2-17)

(Removal)
1 Remove the part A of the LOADING LOCK SPRING shown in Fig. 2-30-1 through the hole of the MAIN PLATE ASSY.
2 Move the LOADING LOCK LEVER in the direction shown by arrow (A) with pushing the part B of it to remove the LOADING LOCK LEVER and LOADING LOCK SPRING as shown in Fig. 2-30-1.

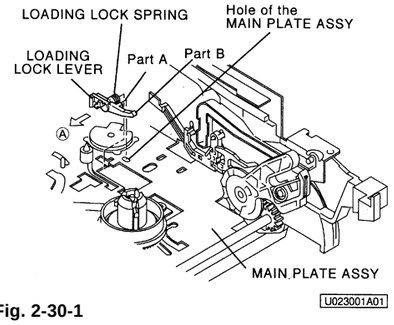


Fig. 2-30-1 U023001A01

(Installation)
1 Attach the LOADING LOCK SPRING shown in Fig. 2-30-2 to the LOADING LOCK LEVER.
2 Move the part A of the LOADING LOCK SPRING shown in Fig. 2-30-2 in the direction shown by arrow (B). Hook the part A of the LOADING LOCK SPRING on the catch of the part B of the LOADING LOCK LEVER.
3 Install the LOADING LOCK LEVER with the LOADING LOCK SPRING attached shown in Fig. 2-30-1 on the MAIN PLATE ASSY.
4 Insert the part A of the LOADING LOCK SPRING shown in Fig. 2-30-1 into the hole of the LOADING LOCK SPRING.

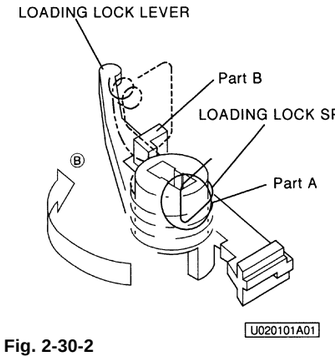


Fig. 2-30-2 U020101A01

2-31 CAPSTAN MOTOR

Place the set upside down.
Before performing replacement in this paragraph, remove the following part. Refer to the applicable paragraph for installation the part.

- REEL BELT (Para. 2-15)

(Removal)
1 Unscrew the three CAPSTAN MOTOR fastening screws (a), (b) and (c) shown in Fig. 2-31-1 to remove the CAPSTAN MOTOR.

(Installation)
1 Set the CAPSTAN MOTOR in the position shown in Fig. 2-31-2 to install it.
Note: Take care not to damage the shaft of the CAPSTAN MOTOR during installation.

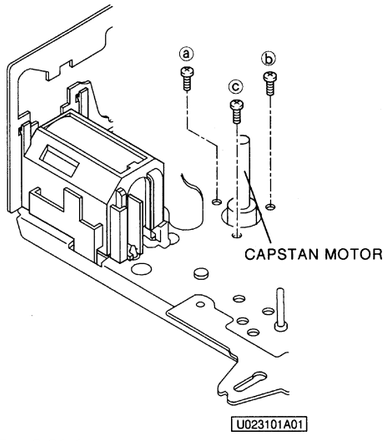


Fig. 2-31-1 U023101A01

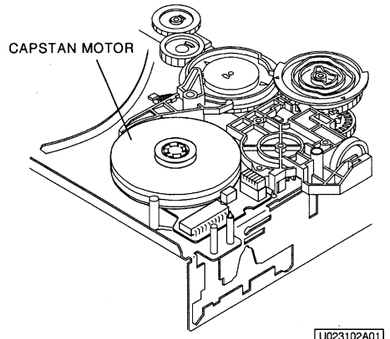


Fig. 2-31-2 U023102A01

2-32 CAM GEAR (SP)

Place the set upside down.
Before performing replacement in this paragraph, remove the following parts. Refer to the applicable paragraph for installation of each part.

- CONTROL WIND LEVER (Para. 2-18)
- TENSION LEVER UNIT (Para. 2-18)
- LOADING GEAR (Para. 2-20)

(Removal)
1 Unfasten the catch (a) on the surface of the CAM GEAR (SP) shown in Fig. 2-32-1 with tweezers, etc. to remove the CAM GEAR (SP).

(Installation)
1 Apply GREASE (MULTEMP SH-A) [859D055O80] to the area specified in Fig. 2-32-2 on the new CAM GEAR (SP).
2 Set the CAM GEAR (TU) shown in Fig. 2-32-3 so that the △ mark on the part B points to the centre of the LAMP LOADING GEAR.
3 Set the CAM GEAR (SP) shown in Fig. 2-32-3 so that the △ mark on the part A points to the centre of the boss into which the LOADING GEAR is to enter and install it.

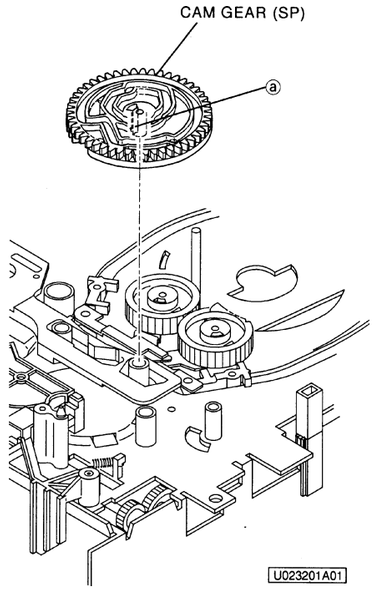
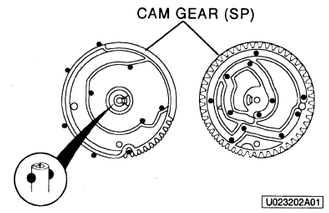


Fig. 2-32-1 U023201A01



Apply GREASE (MULTEMP SH-A) to area ●.

Fig. 2-32-2 U023202A01

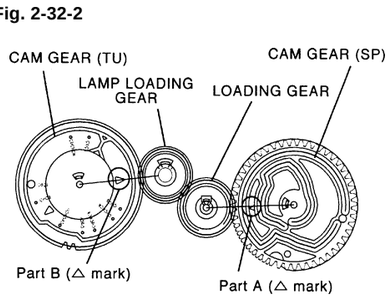


Fig. 2-32-3 U023203A01

2-33 LOADING ARM UNIT (TU), LOADING ARM UNIT (SP)

Place the set upside down.
Before performing replacement in this paragraph, remove the following parts. Refer to the applicable paragraph for installation of each part.

- CONTROL WIND LEVER (Para. 2-18)
- TENSION LEVER UNIT (Para. 2-18)
- LOADING GEAR (Para. 2-20)
- CAM GEAR (SP) (Para. 2-32)

(Removal)
1 Unscrew the two MAIN PLATE SUPPORT fastening screws (a) and (b) shown in Fig. 2-33-1 to remove the MAIN PLATE SUPPORT.
2 Move the TAPE GUIDE ASSY (SP) and TAPE GUIDE ASSY (TU) shown in Fig. 2-33-1 fully to the loading position.
3 Unfasten the catch (c) on the surface of the LOADING ARM UNIT (TU) shown in Fig. 2-33-1 with tweezers, etc. to remove the LOADING ARM UNIT (TU).
4 Unfasten the catch (d) on the surface of the LOADING ARM UNIT (SP) shown in Fig. 2-33-1 with tweezers, etc. to remove the LOADING ARM UNIT (SP).

(Installation)
1 Apply GREASE (MULTEMP SH-A) [859D055O80] to the area specified in Fig. 2-33-2 on the new LOADING ARM UNIT (SP).
2 Install the LOADING ARM UNIT (SP) shown in Fig. 2-33-1.
3 Apply GREASE (MULTEMP SH-A) [859D055O80] to the area specified in Fig. 2-33-2 on the new LOADING ARM UNIT (TU).

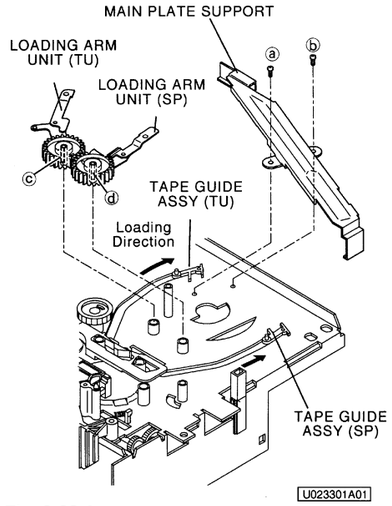
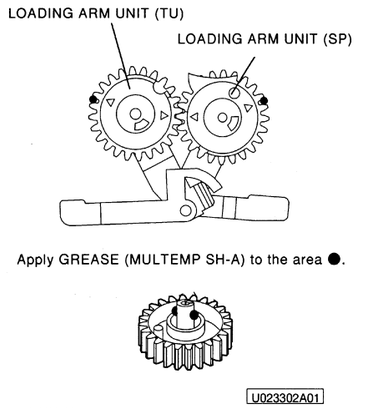


Fig. 2-33-1 U023301A01



Apply GREASE (MULTEMP SH-A) to the area ●.

Fig. 2-33-2 U023302A01

4 Set the LOADING ARM UNIT (TU) shown in Fig. 2-33-3 so that the △ mark of it matches with the △ mark of the LOADING ARM UNIT (SP) and install it.
5 Move the TAPE GUIDE ASSY (SP) and TAPE GUIDE ASSY (TU) shown in Fig. 2-33-1 fully to the unloading position.
6 Install the MAIN PLATE SUPPORT shown Fig. 2-33-1.

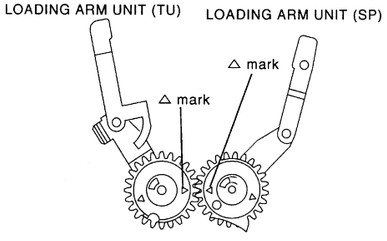


Fig. 2-33-3 U023303A01

2-34 CAM SPRING (C), CAM PLATE UNIT (C)

Place the set upside down.
Before performing replacement in this paragraph, remove the following parts. Refer to the applicable paragraph for installation of each part.

- LAMP GUIDE (Para. 2-7)
- LOADING BELT (Para. 2-11)
- REEL BELT (Para. 2-15)
- CAPSTAN BRAKE SPRING (Para. 2-16)
- CAPSTAN BRAKE (Para. 2-16)
- MODE HOLDER (Para. 2-17)
- REEL LOCK LEVER (Para. 2-17)
- MODE GEAR (Para. 2-17)
- WORM PULLEY UNIT (Para. 2-17)
- CONTROL WIND LEVER (Para. 2-18)
- TENSION LEVER UNIT (Para. 2-18)
- LOADING GEAR (Para. 2-20)
- LAMP LOADING GEAR (Para. 2-20)
- CAM GEAR (TU) (Para. 2-21)
- CAM GEAR (SP) (Para. 2-32)

(Removal)
1 Move the TAPE GUIDE ASSY (SP) and TAPE GUIDE ASSY (TU) shown in Fig. 2-33-1 fully to the loading position.
2 Remove the CAM SPRING (C) shown in Fig. 2-34-1.
3 Move the CAM PLATE UNIT (C) in the direction shown by arrow (A) to remove it as shown in Fig. 2-34-1.

(Installation)
1 Apply GREASE (MULTEMP SH-A) [859D055O80] to the area specified in Fig. 2-34-2 on the new CAM PLATE UNIT (C).

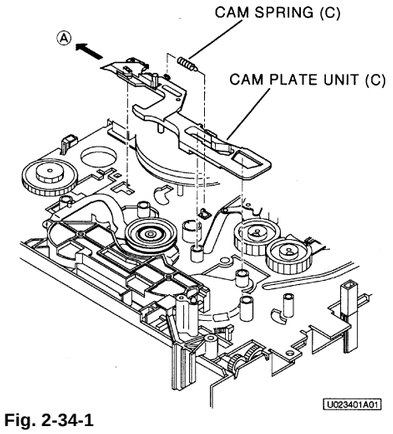
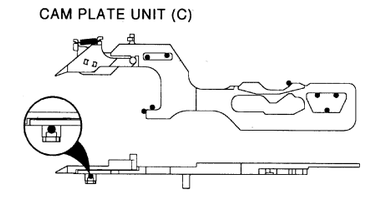


Fig. 2-34-1 U023401A01



Apply GREASE (MULTEMP SH-A) to the area ●.

U023402A01

Fig. 2-34-2

2 Install the CAM PLATE UNIT (C) shown in Fig. 2-34-3 so that the pin (a) of it enters the part A of the SHIFT LEVER.
3 Install the CAM SPRING (C) shown in Fig. 2-34-1.
4 Move the TENSION ARM shown in Fig. 2-34-4 fully to the direction shown by the arrow. Move the TAPE GUIDE ASSY (SP) and TAPE GUIDE ASSY (TU) shown in Fig. 2-33-1 fully to the unloading position.

2-35 TAPE GUIDE ASSY (SP), TAPE GUIDE ASSY (TU)

Place the set upside down.
Before performing replacement in this paragraph, remove the following parts. Refer to the applicable paragraph for installation of each part.

Mechanical Adjustments and Replacements Cont'd

- LAMP GUIDE (Para. 2-7)
- LOADING BELT (Para. 2-11)
- REEL BELT (Para. 2-15)
- CAPSTAN BRAKE SPRING (Para. 2-16)
- CAPSTAN BRAKE (Para. 2-16)
- MODE HOLDER (Para. 2-17)
- REEL LOCK LEVER (Para. 2-17)
- MODE GEAR (Para. 2-17)
- WORM PULLEY UNIT (Para. 2-17)
- CONTROL WIND LEVER (Para. 2-18)
- TENSION LEVER UNIT (Para. 2-18)
- LOADING GEAR (Para. 2-20)
- LAMP LOADING GEAR (Para. 2-20)
- CAM GEAR (TU) (Para. 2-21)
- CAM GEAR (SP) (Para. 2-32)
- LOADING ARM UNIT (TU) (Para. 2-33)
- LOADING ARM UNIT (SP) (Para. 2-33)
- CAM SPRING (C) (Para. 2-33)
- CAM PLATE UNIT (C) (Para. 2-34)

(Removal)
1 Move the TAPE GUIDE ASSY (SP) shown in Fig. 2-35-1 fully to the unloading position to remove it.
2 Move the TAPE GUIDE ASSY (TU) shown in Fig. 2-35-1 fully to the unloading position to remove it.

(Installation)
1 Apply GREASE (MULTEMP SH-A [859D055O80] to the area specified in Fig. 2-35 2 on the MAIN PLATE ASSY.
2 Install the TAPE GUIDE ASSY (TU) shown in Fig. 2-35-1.
3 Install the TAPE GUIDE ASSY (SP) shown in Fig. 2-35-1.
4 Perform adjustments from "GUIDE ROLLER Adjustment" in Item 3-2-1 to "Adjustment of FM Waveform Flatness" in 3-2-5 of "Interchangeability Adjustment of the Mechanism".

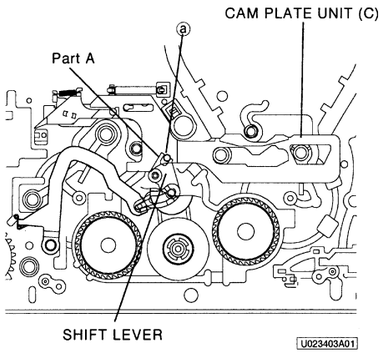


Fig. 2-34-3

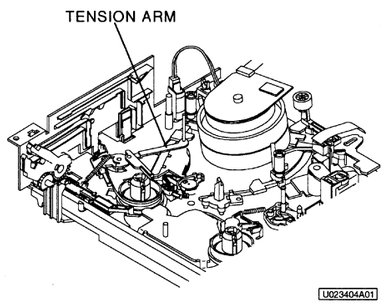


Fig. 2-34-4

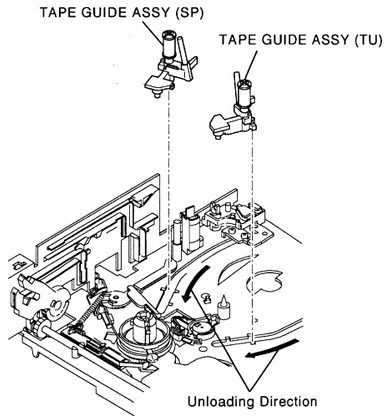


Fig. 2-35-1

2-36 GUIDE ROLLER (SP), GUIDE ROLLER (TU)

(Removal)
1 Loosen the GUIDE ROLLER (SP) fastening screw (a) with a L SHAPED BOX DRIVER (8590433070) so that the GUIDE ROLLER (SP) shown in Fig. 2-36-1 lightly turns.
2 Counterclockwise turn the height adjustment screw (b) at the top of the GUIDE ROLLER (SP) shown in Fig. 2-36-1 with a height adjustment screw driver to remove the GUIDE ROLLER (SP).
3 Loosen the GUIDE ROLLER (TU) fastening screw (c) so that the GUIDE ROLLER (TU) shown in Fig. 2-36-1 lightly turns.
4 Counterclockwise turn the height adjustment screw (d) at the top of the GUIDE ROLLER (TU) shown in Fig. 2-36-1 with a height adjustment screw driver to remove the GUIDE ROLLER (TU).

(Installation)
1 Insert the GUIDE ROLLER (TU) shown in Fig. 2-36-1 into the installation hole on the TAPE GUIDE ASSY (TU).
2 Clockwise turn the height adjustment screw (b) at the top of the GUIDE ROLLER (TU) shown in Fig. 2-36-2 with a height adjustment screw driver so that the GUIDE ROLLER (TU) is at a height of 25.2 mm above the reference plane.
3 Lightly screw the GUIDE ROLLER (TU) fastening screw (c) shown in Fig. 2-36-1.
4 Insert the GUIDE ROLLER (SP) shown in Fig. 2-36-1 into the installation hole on the TAPE GUIDE ASSY (SP).
5 Clockwise turn the height adjustment screw (b) at the top of the GUIDE ROLLER (SP) shown in Fig. 2-36-2 with a height adjustment screw driver so that the GUIDE ROLLER (SP) is at a height of 25.1 mm above the reference plane.

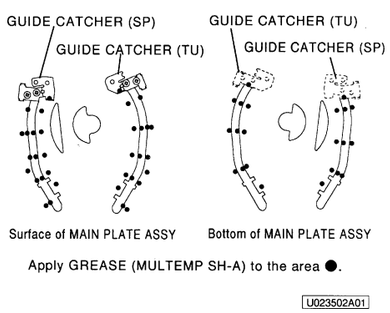


Fig. 2-35-2

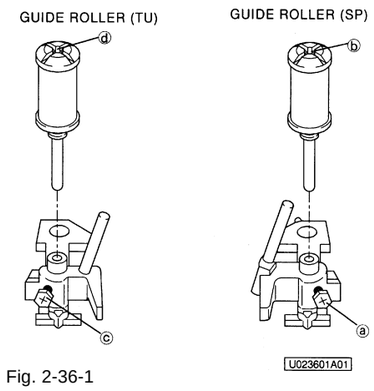


Fig. 2-36-1

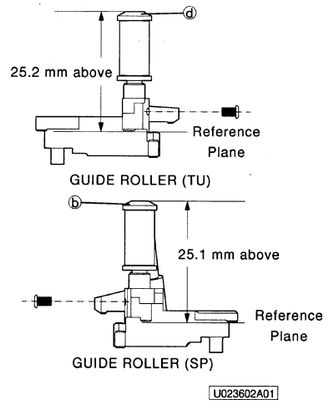


Fig. 2-36-2

6 Lightly screw the GUIDE ROLLER (SP) fastening screw (a) shown in Fig. 2-36-1.
7 Perform 'Check and Adjustment of the FM Envelope" in Para. 3-2 of "Interchangeability Adjustment of the Mechanism".
8 Clean the GUIDE ROLLER (SP) and GUIDE ROLLER (TU) with DRY GAUZE.

2-37 DRUM CLAMPER, DRUM ASSY

(Removal)
1 Disconnect the lead connector of the DRUM ASSY shown in Fig. 2-37-1.
2 Unscrew the two DRUM CLAMPER fastening screws (a) and (b) shown in Fig. 2-37-1 to remove the DRUM ASSY with the DRUM CLAMPER attached.
3 Move the DRUM CLAMPER in the direction shown by the arrow to remove it from the DRUM ASSY as shown in Fig. 2-37-2.
4 If the product is provided with the SHIM shown in Fig. 2-37-1, remove and scrap it.

(Installation)
1 Attach the DRUM CLAMPER shown in Fig. 2-37-2 to the DRUM ASSY.
2 Install the DRUM ASSY with the DRUM CLAMPER attached shown in Fig. 2-37-1 on the MAIN PLATE ASSY.
Note: In installing the DRUM CLAMPER shown in Fig. 2-37-1, first install the screw (b) and then install the screw (a)
3 Connect the lead connector of the DRUM ASSY shown in Fig. 2-37-1.
4 Perform adjustment of "Playback Switching Point" described in ELECTRICAL ADJUSTMENT.
5 Perform "Interchangeability Adjustment of the Mechanism".
6 Clean the DRUM ASSY shown in Fig. 2-37-1 with alcohol.

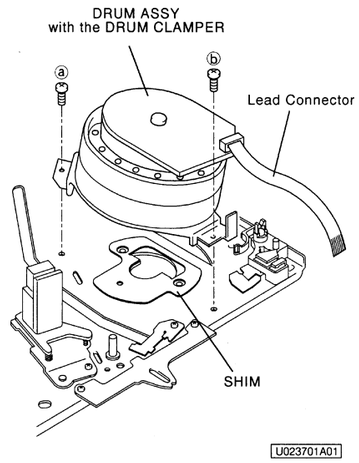


Fig. 2-37-1

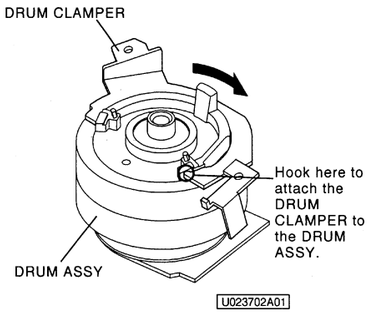


Fig. 2-37-2

2-38 DRUM MOTOR STATOR, BRUSH SPRING, ROTOR CASE, END RING, BRUSH, UPPER DRUM ASSY, SPACER

Position the set normally.

(Removal)
1 Disconnect the lead connector of the DRUM ASSY shown in Fig. 2-38-1.
2 Unscrew the two DRUM MOTOR STATOR fastening screws (a) and (b) shown in Fig. 2-38-1 to remove the DRUM MOTOR STATOR.
3 Unscrew the two ROTOR CASE fastening screws (c) and (d) shown in Fig. 2-38-1 to remove the ROTOR CASE.
4 Loosen the END RING fastening screw (e) [hexagon screw] shown in Fig. 2-38-1 to remove the END RING.
5 Remove the BRUSH SPRING shown in Fig. 2-38-1.
6 Remove the BRUSH shown in Fig. 2-38-1.
7 Remove the UPPER DRUM ASSY shown in Fig. 2-38-1.
8 Remove the SPACER shown Fig. 2-38-1.

(Installation)
1 Install the SPACER shown in Fig. 2-38-1.
Note: Do not use any other SPACER than the one enclosed with the new UPPER DRUM ASSY for replacement.
2 Install the UPPER DRUM ASSY shown in Fig. 2-38-1.
3 Install the END RING shown in Fig. 2-38-1 so that the reference hole (A) of the LOWER DRUM ASSY and the reference hole (B) of the END RING are located on the reference line as shown in Fig. 2-38-2.
4 Apply screw sealing agent to the END RING fastening screw (e) (hexagon screw) shown in Fig. 2-38-1.
5 Install the ROTOR CASE shown in Fig. 2-38-1 so that the reference holes (c) match each other at three points between the ROTOR CASE shown in Fig. 2-38-2 and the UPPER DRUM ASSY.
6 Install the BRUSH shown in Fig. 2-38-1.
7 Install the BRUSH SPRING shown in Fig. 2-38-1.
8 Install the DRUM MOTOR STATOR shown in Fig. 2-38-1.
9 Connect the lead connector of the DRUM ASSY shown in Fig. 2-38-1.
10 Perform adjustment of "Playback Switching Point" described in ELECTRICAL ADJUSTMENT of applicable service manual.
11 Perform "Interchangeability Adjustment of the Mechanism
12 Clean the DRUM ASSY with alcohol.

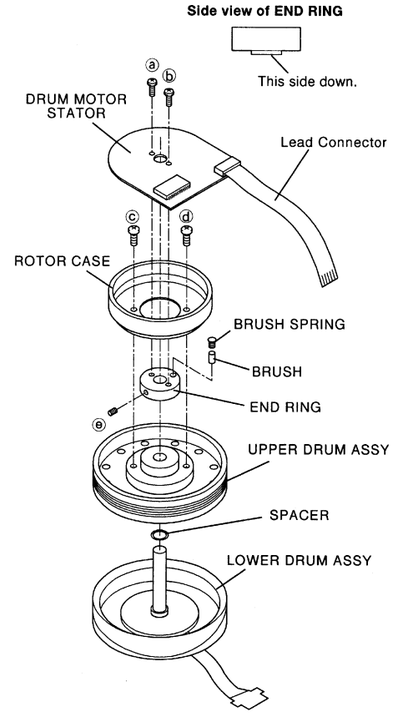


Fig. 2-38-1

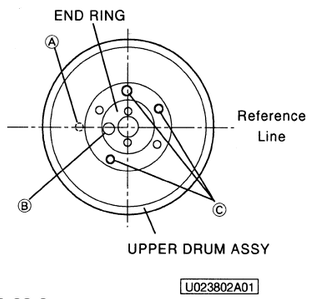


Fig. 2-38-2

2-39 SHIFT LEVER

Place the set upside down.
Before performing replacement in this paragraph, remove the following parts. Refer to the applicable paragraph for installation of each part.

- LAMP GUIDE (Para. 2-7)
- LOADING BELT (Para. 2-11)
- REEL BELT (Para. 2-15)
- CAPSTAN BRAKE SPRING (Para. 2-16)
- CAPSTAN BRAKE (Para. 2-16)
- BELT PULLEY (Para. 2-15)
- SHIFT SPRING (Para. 2-15)
- MODE HOLDER (Para. 2-17)
- REEL LOCK LEVER (Para. 2-17)
- MODE GEAR (Para, 2-17)
- WORM PULLEY UNIT (Para. 2-17)
- CONTROL WIND LEVER (Para. 2-18)
- TENSION LEVER UNIT (Para. 2-18)
- LOADING GEAR (Para. 2-20)
- LAMP LOADING GEAR (Para. 2-20)
- CAM GEAR (TU) (Para. 2-21)
- PHOTO UNIT (Para. 2-22)
- IDLER CENTER LEVER (Para. 2-23)
- PULLEY GEAR (Para. 2-24)
- IDLER UNIT (Para. 2-24)
- CAM GEAR (SP) (Para. 2-32)
- CAM SPRING (C) (Para. 2-34)
- CAM PLATE UNIT (C) (Para. 2-34)

(Removal)
1 Remove the SHIFT LEVER shown in Fig. 2-39-1.

(Installation)
1 Apply GREASE (MULTEMP SH-A) [859D055O80] to the area of the new SHIFT LEVER shown in Fig. 2-39-2.
2 Install the SHIFT LEVER shown in Fig. 2-39-1.

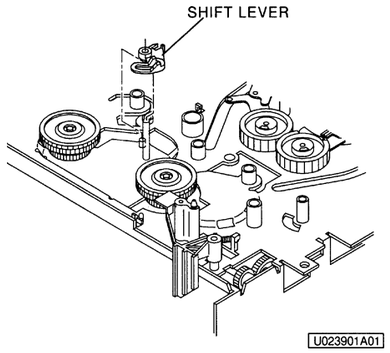


Fig. 2-39-1

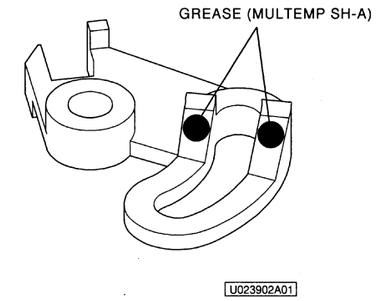


Fig. 2-39-2

3. Interchangeability Adjustment of the Mechanism

Note 1: Tracking may need to be preset during interchangeability adjustment of the mechanism. Digital tracking is preset by short circuiting TP5A and TP5B on the PCB-MAIN.

Note 2: The adjustments are performed in the playback mode, using the staircase signal of an alignment tape. Connect an oscilloscope to TP2A and external Trigger from TP2H, unless otherwise specified.

3-1 Adjustment of BACK TENSION and TENSION PIN Position

Run a blank tape for several minutes to break in the RELL DISKs and the transport before making the adjustment.

1 Play back an alignment tape.
[PM6KH3: 859C339O30]

Mechanical Adjustments and Replacements Cont'd

2 Make sure that the TENSION PIN is in the position shown in Fig. 3-1-1.
3 If the TENSION PIN is not in the position specified in Fig. 3-1-1, turn the boss to set the TENSION PIN to be in position.
4 Insert the BACK TENSION MEASURING JIG (859C345O80) and set the VOR to the play-back mode.
5 Make sure that the reading of the BACK TEN SION MEASURING JIG is within 50±6g/cm.
Note: Before the measurement, make sure that the tape travel has become steady. If the reading exceeds the specified value, replace the TENSION SPRING.
6 While tape travel is steady, check visually to make sure that the runout of the TENSION PIN is 1 mm or less. If the runout exceeds the specified value, replace the REEL DISK.

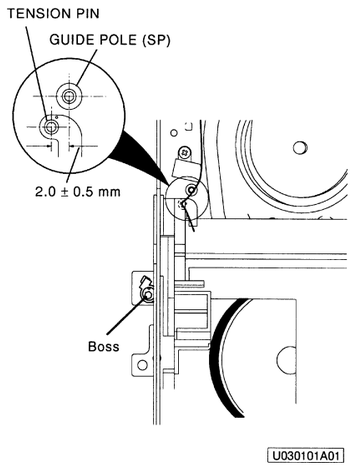


Fig. 3-1-1

3-2 Check and Adjustment of the FM Envelope

3-2-1 GUIDE ROLLER Adjustment

IMPORTANT
The Guide Rollers are secured by a hexagon screw, however, this screw, does not require to be loosened for adjustments to be made. The torque is sufficient to prevent movement in normal use, but will allow movement when subjected to screwdriver application when adjusting the height.

For removal of the Guide Roller a box driver (859C433O70) is required.

1 Play back an alignment tape.
[PM6KH3: 859C339O30]
2 Preset tracking.
3 Make sure that the FM waveform is flat like A.
4 Perform "Adjustment of GUIDE ROLLER (SP) Height" in Item 3-2-2 if the leading portion (the entry side of the DRUM) of the FM waveform is like B or C. Perform "Adjustment of GUIDE ROLLER (TU) Height" in Item 3-2-3 if the trailing portion (the exit side of the DRUM) is like D or E.

3-2-2 Adjustment of GUIDE ROLLER (SP) Height

Please read 32.1 'Guide Roller Adjustment', before proceeding.

1 Observe the leading edge (the entry side of the DRUM) of the FM waveform. If it is like B, the GUIDE ROLLER (SP) may be lower than the specified position, and if it is like C, the GUIDE ROLLER (SP) may be higher. Turn the adjustment screw at the top of the GUIDE ROLLER (SP) so that the FM waveform becomes flat like A.
• Counterclockwise turn the adjusting screw if the roller is low.
• Clockwise turn the adjusting screw if the roller is high.
2 Perform "Coarse Adjustment of Phase" in Item 3-2-4.

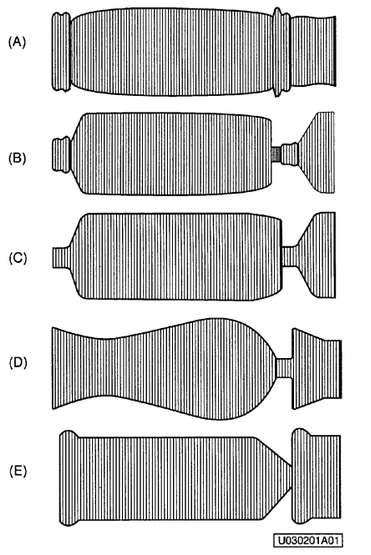


Fig. 3-2-1

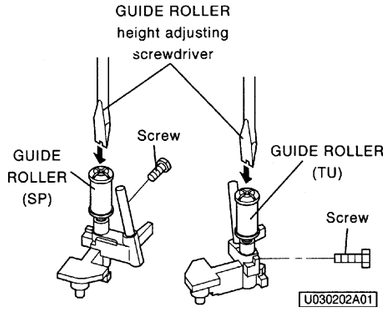


Fig. 3-2-2

3-2-3 Adjustment of GUIDE ROLLER (TU) Height

Please read 3.2.1 Guide RollerAdjustment', before proceedings.

1 Observe the trailing edge (the exit side of the DRUM) of the FM waveform. If it is like D, the GUIDE ROLLER (TU) may be lower than the specified position, and if it is like E, the GUIDE ROLLER (TU) may be higher. Turn the adjustment screw at the top of the GUIDE ROLLER (TU) so that the FM waveform becomes flat like A.
• Counterclockwise turn the adjustment screw if the roller is low.
• Clockwise turn the adjustment screw if the roller is high.
2 Perform "Coarse Adjustment of Phase" in Item 3-2-4.

3-2-4 Coarse Adjustment of Phase

1 Play back an alignment tape.
[PM6KH3: 859C339O30]
2 Preset tracking.
3 Check the FM waveform after performing "GUIDE ROLLER Adjustment" in Item 3-2-1.
4 If the amplitude of the FM waveform is narrow like F because of out of phase, adjust it to the maximum like G in Fig. 3-2-4, by the following procedure. Loosen the screws E and D and insert a screw driver into the plastic boss of the MAIN PLATE ASSY. Move the A/C PLATE right and left to adjust the amplitude level of the FM waveform to the maximum. [Waveform G in Fig. 3-2-4]
5 Tighten the screws E and D.

3-2-5 Check of FM Waveform Flatness

1 Play back an alignment tape.
[PM6KH3: 859C339O30]
Note: Perform the following procedure for selection of tracking method (manual or automatic) and for tracking adjustment.
• Turn the JOG dial while pressing the O.K.PROG.button on the VCR during playback.
• To switch from manual tracking back to automatic digital tracking, press the O.K.PROG. button on the VCR during playback.
2 Select the manual tracking mode. Change tracking and make sure that the amplitude is changeable while the FM signal remains flat.
3 Adjust the tracking so that the amplitude level of the FM waveform is maximum. Set the oscilloscope so that the amplitude level of the FM waveform is 5 divisions.
4 Adjust tracking so that the peak value of the FM waveform is 4 divisions. Check if the FM waveforms B, C, D and E are within the specified values shown in Fig. 3-2-5.
5 If the waveform is not within the specified value, repeat the procedure in Item 3-2 "Check and adjustment of the FM Envelope" from the beginning.

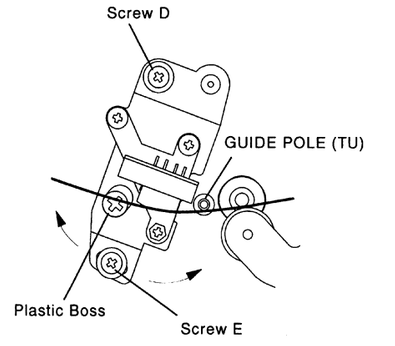


Fig. 3-2-3

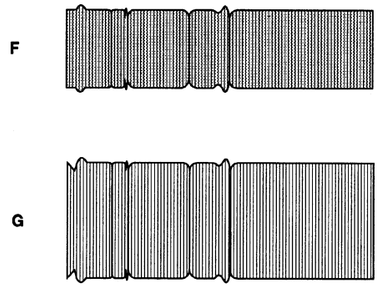
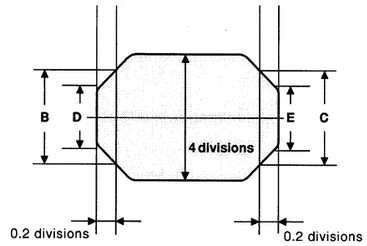


Fig. 3-2-4



B,C	At least 2.8 of the scale
D,E	At least 2.0 of the scale

U030205A01

Fig. 3-2-5

3-2-6 Tape Running Condition at the GUIDE ROLLERs (Check 1)

1 Play back an alignment tape.
[PM6KH3: 859C339O30]
2 Visually check if there is a space between the tape and the lower flanges of the GUIDE ROLLER (SP) and GUIDE ROLLER (TU).
3 If there is no space, replace the ASSY TAPE GUIDE (SP) and TAPE GUIDE ASSY (TU) according to Para. 2-35 in "Replacement of Major Parts".
4 Alternately load and unload the tape several times, check that flatness of the FM waveform does not change.
5 If flatness changes, check the installation condition of the A/C HEAD. If it is abnormal installed, replace the NC HEAD UNIT according to para. 2-4 and perform "Coarse Adjustment of Phase" in Item 3-2-4 again.

3-2-7 Tape Running Condition at the GUIDE ROLLERs (Check 2)

1 Play back an alignment tape.
[PM6KH3: 859C339O30]
2 Lightly press and release the top of the GUIDE ROLLER (SP) and GUIDE ROLLER (TU). Check that the FM waveform is quickly restored to the previous level.
3 Replace the TAPE GUIDE ASSY (SP) and TAPE GUIDE ASSY (TU) according to Para. 2-35 in "Replacement of Major Parts".

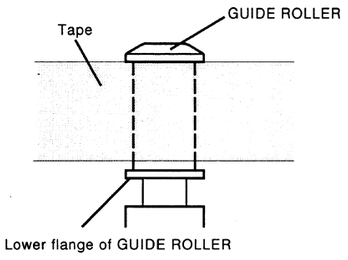


Fig. 3-2-6

3-3 Adjustment of A/C HEAD

3-3-1 Adjustment of A/C HEAD Slant

1 Play back a blank tape.
2 Slowly turn the adjusting screw C counterclockwise to slightly crease the bottom of the tape at the flange portion of GUIDE POLE (TU).
3 Slowly return the adjusting screw C to remove the crease.
4 Slowly turn the adjusting screw C counter-clockwise again and stop it just before the tape is creased.

3-3-2 Adjustment of A/C HEAD Azimuth and Height

1 If the height of the CONTROL HEAD is different from the specified value in Fig. 3-3-2, adjust it with the adjusting screw A.
2 After adjustment with the screw A, perform "Adjustment of A/C HEAD Slant" in Item 3-3-1 again.
3 Connect the oscilloscope to the audio output terminal.
4 Play back an alignment tape.
[PM6KH3: 859C339O30]
5 Adjust the audio output level to the maximum by turning the Azimuth adjusting screw B shown in Fig. 3-3-1. After the adjustment, pull out the screw driver and check if the audio output level is 4.6 divisions or more, where the maximum audio output level is set to 5. If the audio output level is less than 4.6, repeat the procedure 1~5.
6 Push the A/C HEAD to the right and left (in the direction A and A' in Fig. 3-3-1) and then release it. Check that the audio output level does not change. (Do not push the A/C HEAD such a degree that the audio output level is reduced less than 3/4 of its maximum value.)
7 Check that the change in the audio output level is less than 2 dB.
8 If the change exceeds 2 dB, perform "Adjust-ment of A/C HEAD Slant" in Item 3-3-1 and this adjustment.
9 If the above procedure of adjustment proves to be unsatisfactory, replace the TAPE GUIDE ASSY (SP) and TAPE GUIDE ASSY (TU) according to Para. 2-35 (Replacement of Major Parts).

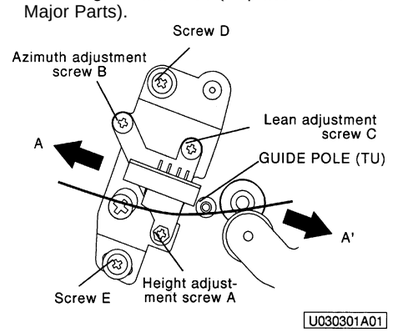


Fig. 3-3-1

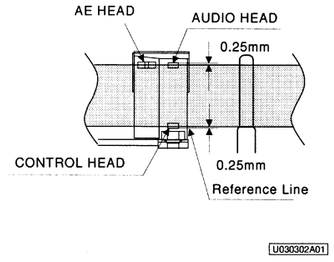


Fig. 3-3-2

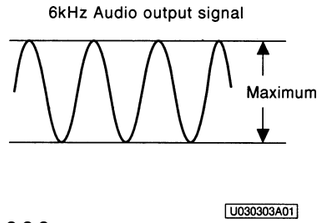


Fig. 3-3-3

3-4 Adjustment of Phase

1 Set the VCR to the playback mode. (Use the alignment tape specified below to perform adjustment 1—4). [PM3KE6 (CH1) 25: 859C568O50]
2 Preset tracking.
3 Loosen the screws E and D and insert a screw driver into the plastic boss of the MAIN PLATE ASSY. Move the A/C PLATE right and left to adjust the FM output waveform to the maximum.
4 Tighten the screws E and D.
5 Play back the alignment tape.
[PMX: 859C568O70]
6 Connect TP2A (the FM waveform output) and the audio output terminal to the oscilloscope, external Trig, to TP2H, and check if the missing portions of the FM waveform and that of the audio waveform are within the specified value (field). (Refer to Fig. 3-4-2.)
7 If they are not within the specified value, repeat the procedure 3.
8 Turn the normal tracking control to adjust the FM waveform for maximum and set the oscilloscope so that the waveform is '5' divisions. (Refer to Note in Para. 3-2-5 about tracking adjustment.)
9 Preset tracking.
10 Check that the FM waveform on the oscillo-scope is "4.8" or more divisions.
11 If the FM waveform is below "4.8" divisions, perform this adjustment after tracking preset.
12 Push the A/C HEAD to the right and left (in the direction of A-A' in Fig. 3-4-1) and then release the A/C HEAD. Check that the amplitude of the FM waveform does not change from that before shifting the A/C HEAD.
13 When the FM waveform Varies in amplitude level, check the mounting position of the A/C HEAD UNIT. If the portion is incorrect, correct the position following Item 2-4 "A/C HEAD UNIT" perform Item 3-3 "Adjustment of A/C HEAD" and repeat this adjustment from the beginning.
14 Alternately load and unload the tape several times to check that the amplitude of the FM waveform does not change.

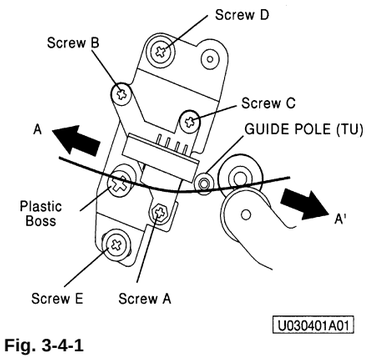


Fig. 3-4-1

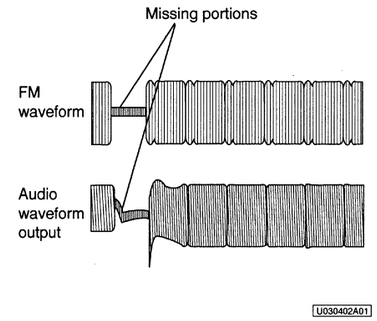


Fig. 3-4-2

Mechanical Adjustments and Replacements Cont'd

3-5 Adjustment of GUIDE ARM ASSY (TU) Height

1 Run a final portion of T-240 blank tape in the reverse search mode.
2 Tighten the NYLON NUT of the GUIDE ARM ASSY (TU) with a box driver to lower the GUIDE ARM ASSY (TU) until the tape is creased at the lower flange of the GUIDE POLE (TU). Then slowly return the NYLON NUT, stop it at the point where the crease is removed. (During adjustment, use an uncovered cassette tape, or raise the cover so that the adjustment is available.)
Note: During adjustment, turn the NYLON NUT in the loosening direction. Do not turn the NYLON NUT more than ±1/2 turn.
3 Eject and insert the cassette tape, and then set the VCR to the reverse search mode again. Check that the tape is not creased at the lower flange of the GUIDE POLE (TU). If the crease cannot be removed, repeat the procedure 1—3.
4 Set the VCR to the playback mode and check that the tape is not creased at the lower flange of the GUIDE POLE (TU). If the crease cannot be removed, repeat "Adjustment of A/C HEAD Slant" in Item 3-3-1 and the succeeding adjustments.
5 Run the start portion of T-180 blank tape in the forward search mode and check that the tape is not creased at the GUIDE POLE (TU).

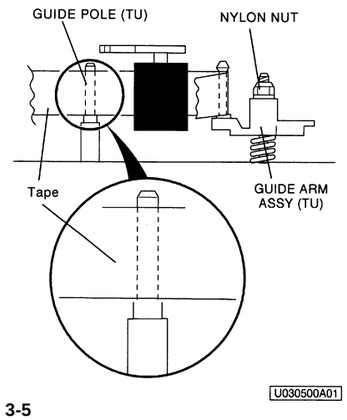


Fig. 3-5

4. Servicing for Tape Jamming during the Loading Process

1 Remove, the DECK ASSY.
2 If the tape is caught in the mechanical parts to lock it, remove the tape.
3 If the TAPE GUIDE ASSY is in a status for loading, turn the LOADING MOTOR ASSY shown in Fig. 4-1 in the direction shown by arrow (A) and move the TAPE GUIDE ASSY fully to the loading direction.
4 Turn the CAPSTAN MOTOR shown in Fig. 4-1 in the direction shown by arrow (B) to wind the tape up within the cassette.
5 Turn the LOADING MOTOR ASSY shown in Fig. 4-1 in the direction shown by arrow (A) to eject the tape.

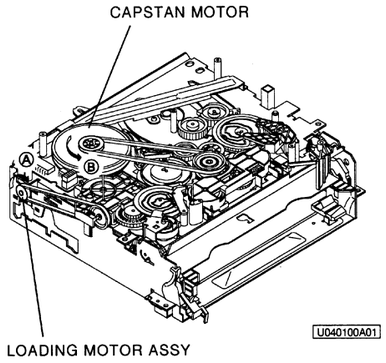
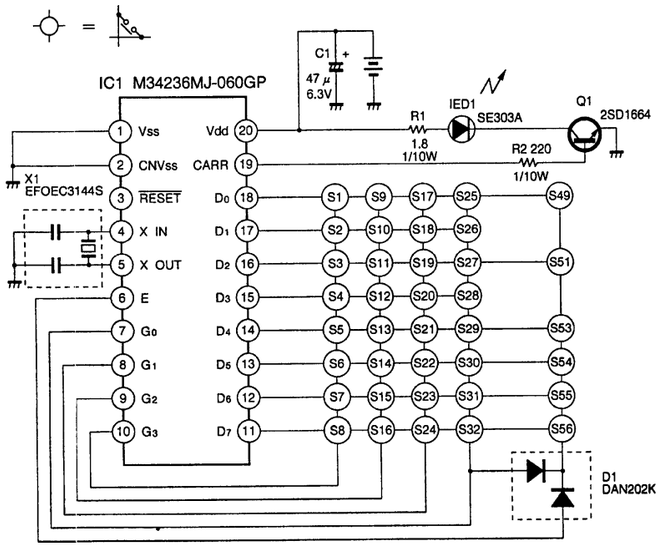


FIG. 4-1

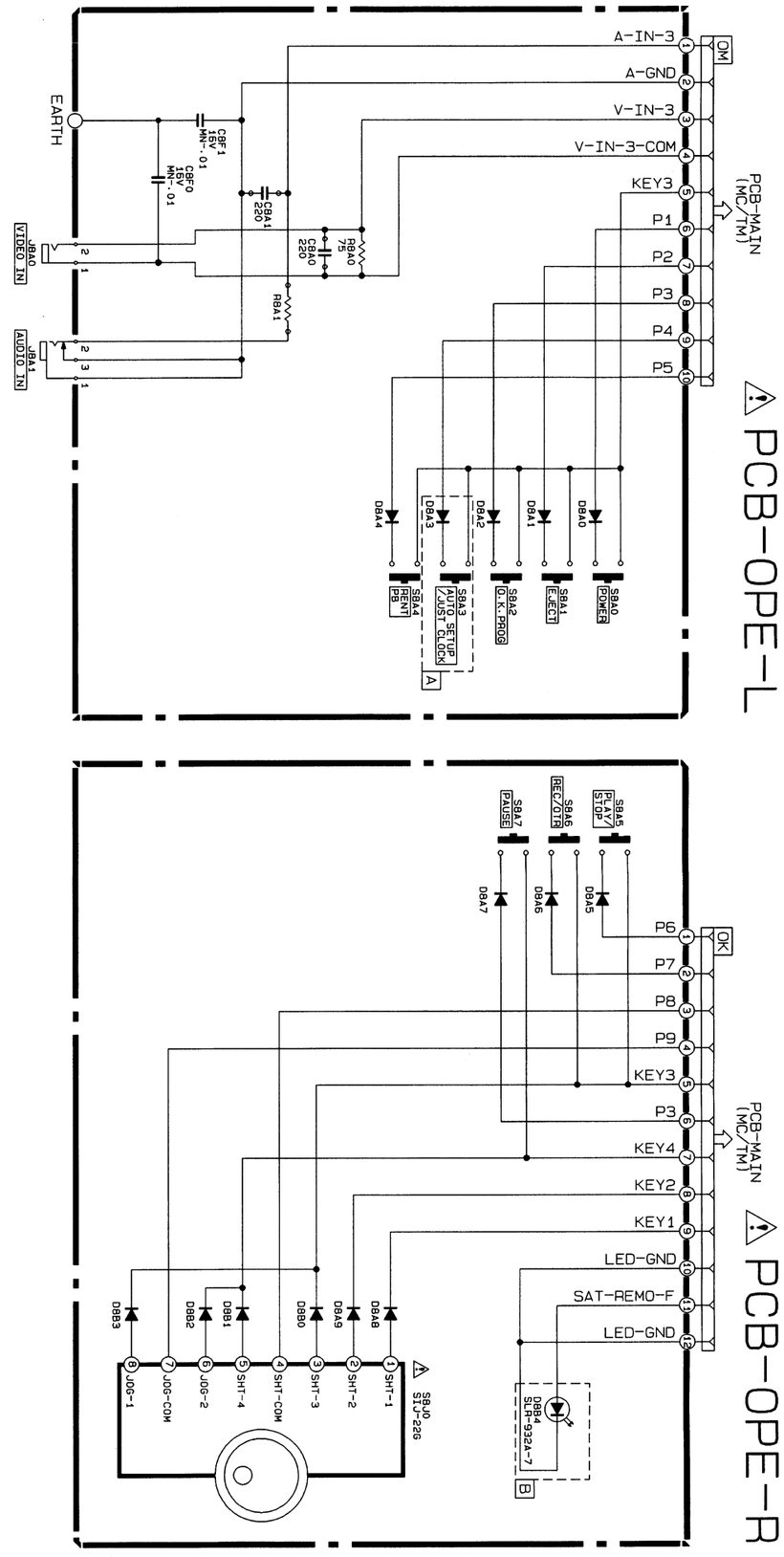
Remote Control Diagram



KEY NO.	FUNCTION
S1	VCR POWER
S2	CANCEL
S3	VIDEO/TV
S4	3
S5	SHUTTLE/INDEX ▶
S6	2
S7	REC
S8	1
S9	PAUSE
S10	SP/LP
S11	9
S12	6
S13	8
S14	5
S15	7
S16	4
S17	O.K.PROG.
S18	TV CHANNEL ▲
S19	G-CODE

KEY NO.	FUNCTION
S20	VOLUME ▲
S21	0
S22	TV POWER
S23	– / – –
S24	SHUTTLE/INDEX ◀
S25	FF
S26	TV CHANNEL ▼
S27	PLAY/STOP
S28	VOLUME ▼
S29	JOG +
S30	AV
S31	REW
S32	JOG -
S49	DAILY/WEEKLY
S51	MENU
S53	EJECT
S54	CT RESET/NEXT
S55	1-2-3 MENU
S56	DATA ON SCREEN

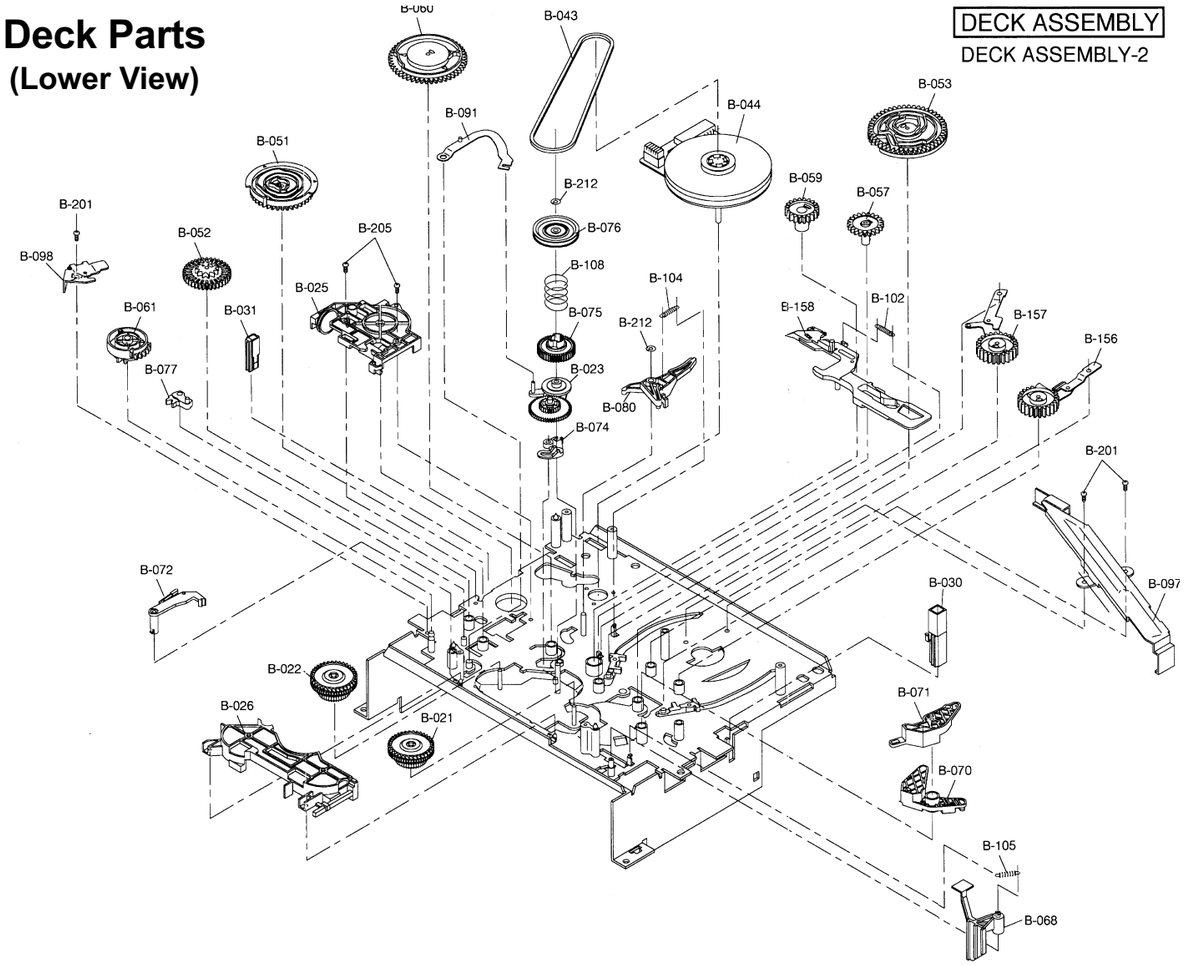
Front Panel Diagram



Exploded Parts Views

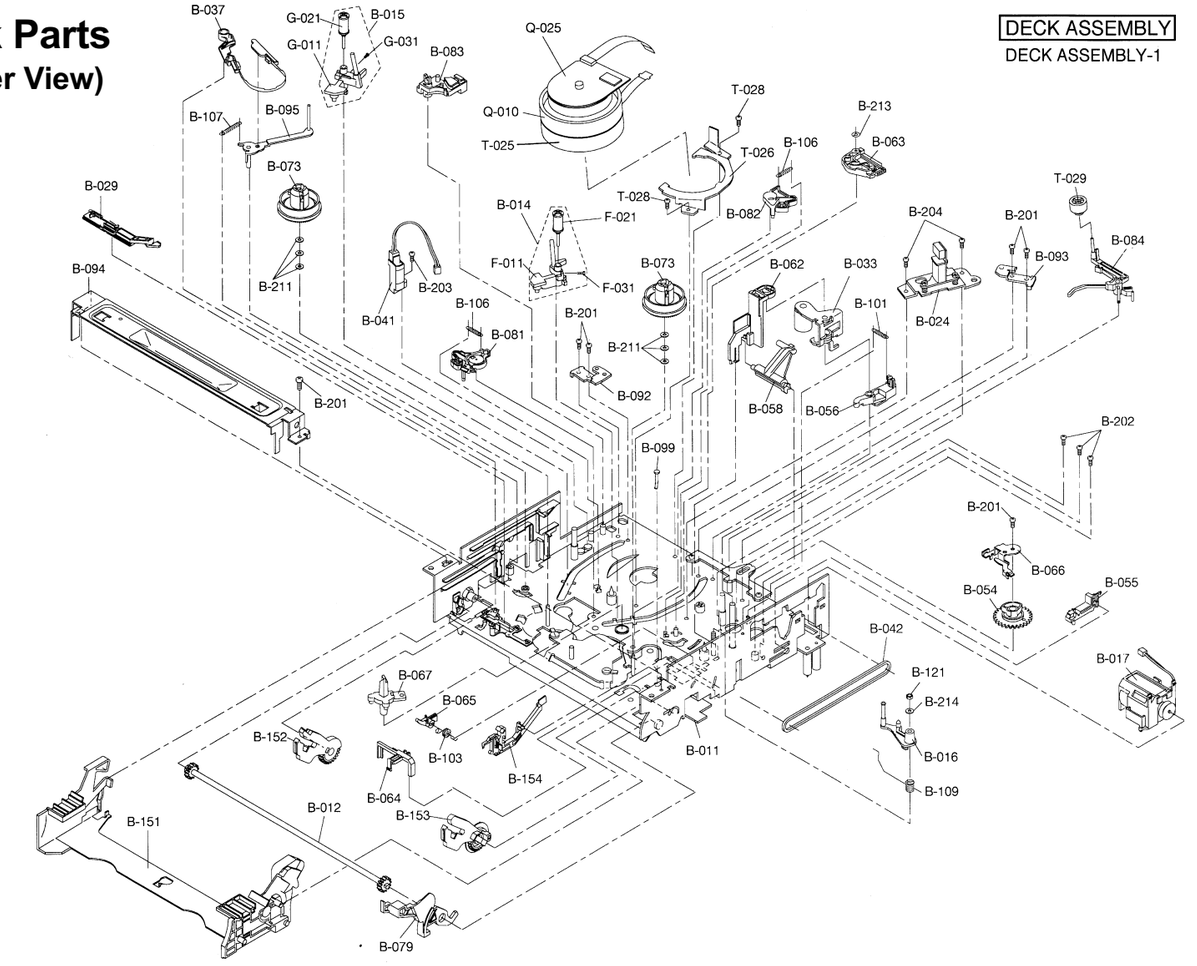
Deck Parts (Lower View)

DECK ASSEMBLY
DECK ASSEMBLY-2



Deck Parts (Upper View)

DECK ASSEMBLY
DECK ASSEMBLY-1



Deck Mechanical Parts

Item	Part No.		Description
B-011	948A194001	F-7	MAIN PLATE ASSY
B-012	948C338001	C-7	SYNC GEAR ASSY
B-014	948D059001	E-2	TAPE GUIDE ASSY(TU) TAKE UP
B-015	948D060001	D-1	TAPE GUIDE ASSY(SP) SUPPLY
B-016	948D062001	H-7	GUIDE ARM ASSY(TU)
B-017	928D350001	J-6	LOADING MOTOR ASSY
B-024	460C006010	H-3	A/C HEAD UNIT
B-029	621C551010	A-2	WIND LEVER UNIT
B-033	593C817010	H-3	PINCH ARM UNIT
B-037	621C557010	B-1	TENSION BELT UNIT
B-041	460P055050	D-3	FE HEAD
B-042	521D096010	H-6	LOADING BELT
B-054	641B790010	I-5	PINCH CAM GEAR
B-055	621C505010	J-5	PINCH RACK SLIDER
B-056	635C104010	G-4	PINCH CAM LEVER
B-058	635C108010	G-4	PINCH GEAR ARM 2
B-062	641B798010	G-3	PINCH ARM CAP
B-063	621C532010	H-2	LOADING TG LEVER
B-064	621C498010	D-7	MODE POSITION GUIDE
B-065	621C529010	D-6	LOADING LOCK LEVER
B-066	593C923010	I-5	PINCH CAM HOLDER
B-067	621C486010	D-6	LAMP GUIDE
B-073	641B788010	C-2	F-3 REEL. DISK
B-079	641B782010	D-8	F/L DOOR ARM
B-081	641B800010	E-3	MAIN BRAKE(SP) SUPPLY
B-082	641B801010	G-2	MAIN BRAKE(TU) TAKE UP
B-083	621C530010	D-1	GUIDE ARM(SP) SUPPLY
B-084	641B785010	J-2	CLEANING ARM
B-092	593C800010	F-4	GUIDE CATCHER(SP)
B-093	593C801010	I-3	GUIDE CATCHER(TU)
B-094	592B274010	A-3	STAY PLATE
B-095	592B280010	C-1	TENSION ARM
B-099	622D615010	F-4	SNAP PIN
B-101	572D844010	H-3	PINCH CAM SPRING
B-103	572D858010	D-7	LOADING LOCK SPRING

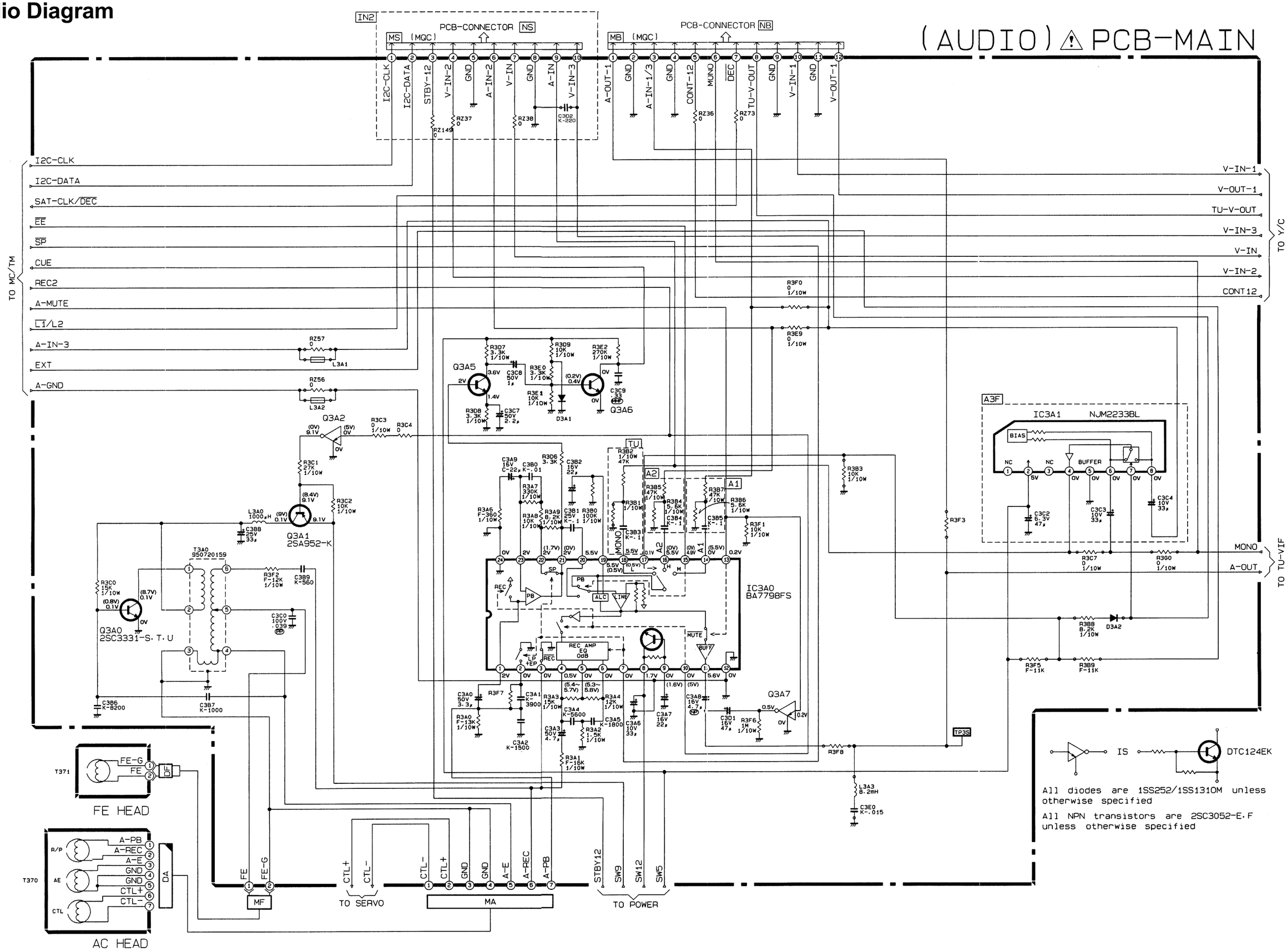
Deck Mechanical Parts Cont'd

Item	Part No.		Description
B-106	572D839010	D-3	G-2 BRAKE SPRING
B-107	572D840010	B-1	TENSION SPRING
B-109	5720843010	H-7	GUIDE SPRING(TU)
B-121	674D081020	H-6	NYLON NUT
B-151	515B001010	B-7	BOTTOM UNIT
B-152	515C001010	C-7	F/L ARM UNIT(SP)
B-153	515C001020	0-7	F/L ARM UNIT(TU)
B-154	621C533010	E-7	SHUT LEVER UNIT
B-201	669D224010	C-4 E-3 I-2 I-5	SCREW 2. 6X6
B-202	669D285040	J-4	SCREW M2. 6X8
B-203	669D224030	D-3	SCREW 2. 6X10
B-204	669D476020	H-2	SCREW 2. 6X8
B-211	552C017020	C-3 F-3	THRUST WASHER 2. 5X6X0. 13
B-213	552C018070	H-I	CUT WASHER 2. 1X5. 0X0. 5
B-214	683D114004	H-6	SL WASHER
F-011	635B091010	E-3	TAPE GUIDE(TU) TAKE UP
F-021	522B061010	F-2	GUIDE ROLLER(TU)
F-031	669D506090	F-3	SCREW M2X0. 4 L=4
G-011	635B092010	C-1	TAPE GUIDE(SP) SUPPLY
G-021	522B061010	C-1	GUIDE ROLLER(SP)
G-031	669D506090	D-1	SCREW M2X0. 4 L=4
Q-010	927B960021	E-1	UPPER DRUM ASSY
Q-010	927B964020	E-1	UPPER DRUM ASSY (HS-621V only)
Q-025	288P158010	E-1	DRUM MOTOR E20EL50
T-025	927B961001	F-1	LOWER-DRUM ASSY
T-025	927B965001	F-1	LOWER-DRUM ASSY (HS-621V only)
T-026	592B345010	G-2	DRUM CLAMPER
T-028	669D224010	F-2 G-1	SCREW 2. 6X6
T-029	622D598010	I-2	CLEANING ROLLER UNIT
B-021	641B805010	D-6	REEL GEAR UNIT (SP) SUPPLY
B-022	641B805020	C-6	REEL GEAR UNIT (TU) TAKE UP
B-023	621C536010	E-4	IDLER UNIT
B-025	621C538010	C-3	WORM PULLEY UNIT
B-026	641B827010	B-6	PHOTO UNIT

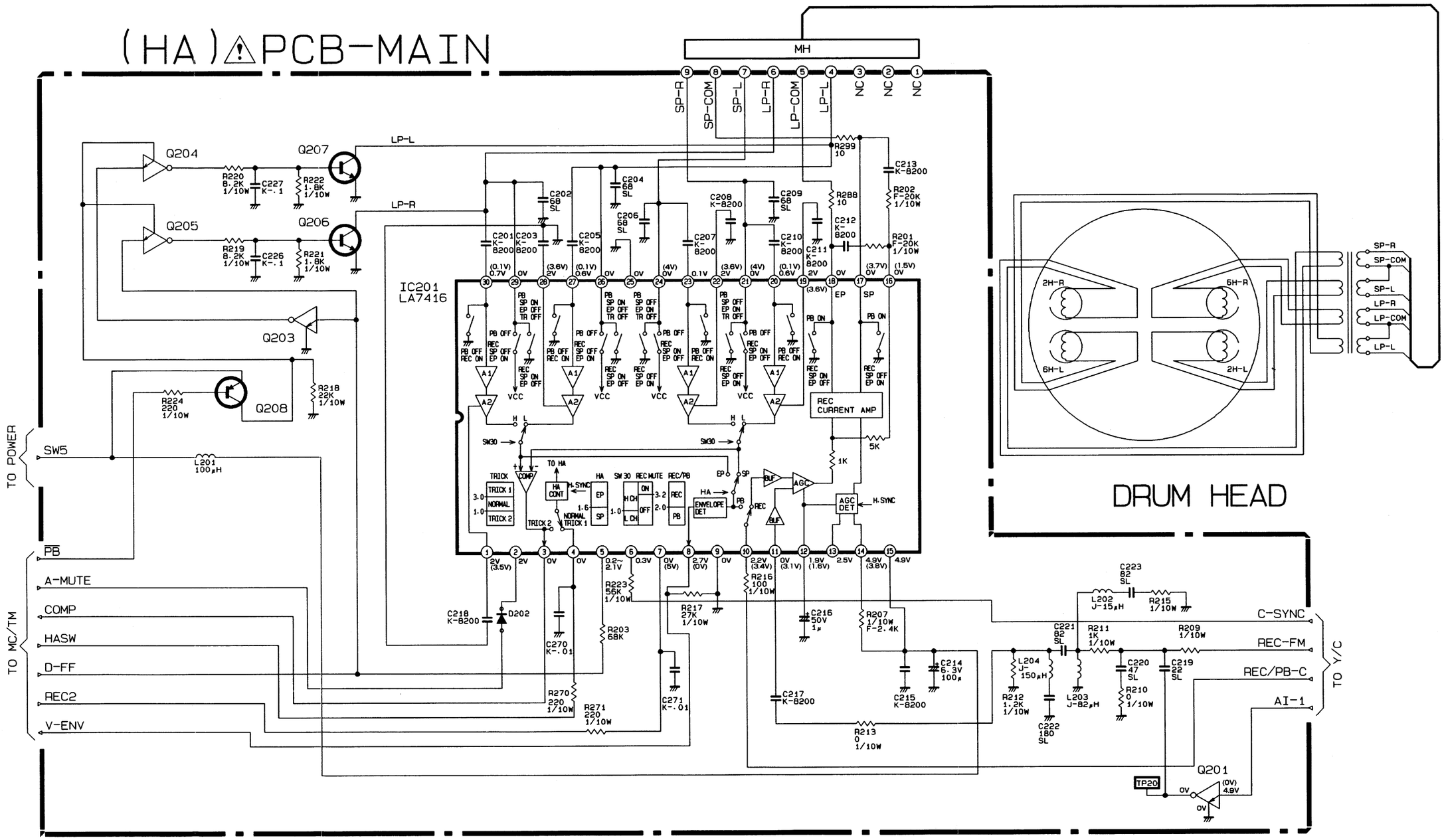
Deck Mechanical Parts Cont'd

Item	Part No.		Description
B-030	622D585010	G-5	PHOTO GUIDE UNIT (SP) SUPPLY
B-031	622D586010	B-3	PHOTO GUIDE UNIT (TU) TAKE UP
B-043	521D097010	E-1	REEL BELT
B-044	288P159010	F-2	CAPSTAN MOTOR F2QTB22
B-051	641B794010	C-2	MODE GEAR
B-052	621C504010	B-3	LOADING WORM GEAR
B-053	641B791010	G-2	CAM GEAR(SP) SUPPLY
B-057	621C503010	G-2	LOADING GEAR
B-059	621C502010	F-2	LAMP LOADING GEAR
B-060	641B792010	D-1	CAM GEAR (TU) TAKE UP
B-061	641B793010	B-3	F/L DRIVE GEAR
B-068	641B817010	H-8	REC LEVER
B-070	641B838010	G-6	TENSION LEVER UNIT
B-071	621C508010	G-6	CONTROL WIND LEVER
B-072	621C506010	B-5	REEL LOCK LEVER
B-074	621C494010	E-4	SHIFT LEVER
B-075	621C493010	E-3	PULLEY GEAR
B-076	621C492010	E-3	BELT PULLEY
B-077	635C106010	B-4	F/L DRIVE LEVER
B-080	641B819010	E-4	CAPSTAN BRAKE
B-091	593C799010	D-2	IDLER CENTER LEVER
B-097	592B365010	I-5	MAIN PLATE SUPPORT
B-098	593C903010	A-3	MODE HOLDER
B-102	572D835010	G-3	CAM SPRING (C)
B-104	572D842010	E-3	CAPSTAN BRAKE SPRING
B-105	572D870010	H-7	REC SPRING
B-108	572D865010	E-3	SHIFT SPRING
B-156	593C825010	H-3	LOADING ARM UNIT(SP) SUPPLY
B-157	593C826010	H-3	LOADING ARM UNIT(TU) TAKE UP
B-158	621C537010	F-3	CAM PLATE UHIT (C)
B-201	669D224010	A-2 1-4	SCREW 2. 6X6 (x3)
B-205	669D224050	C-3	SCREW 2. 6X14 (x2)
B-212	552C018010	E-2 E-3	CUT WASHER 2. 5X6. 0X0. 5 (2)

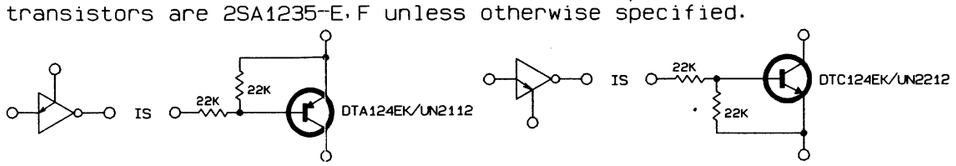
Audio Diagram



Head Amp Diagram

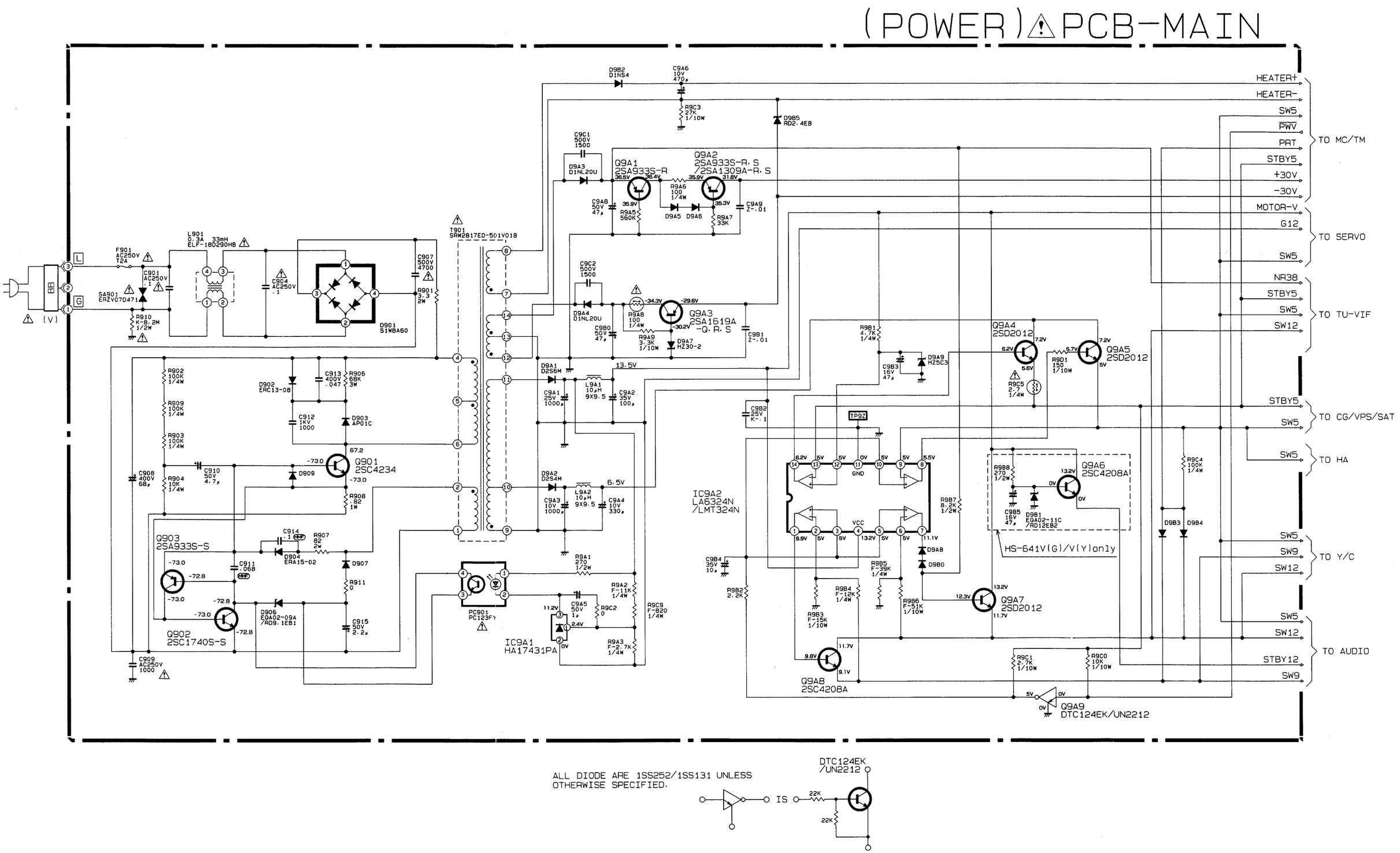


All diodes are 1SS252/1SS1310M unless otherwise specified.
All NPN transistors are 2SC3052-E, F unless otherwise specified.
All PNP transistors are 2SA1235-E, F unless otherwise specified.

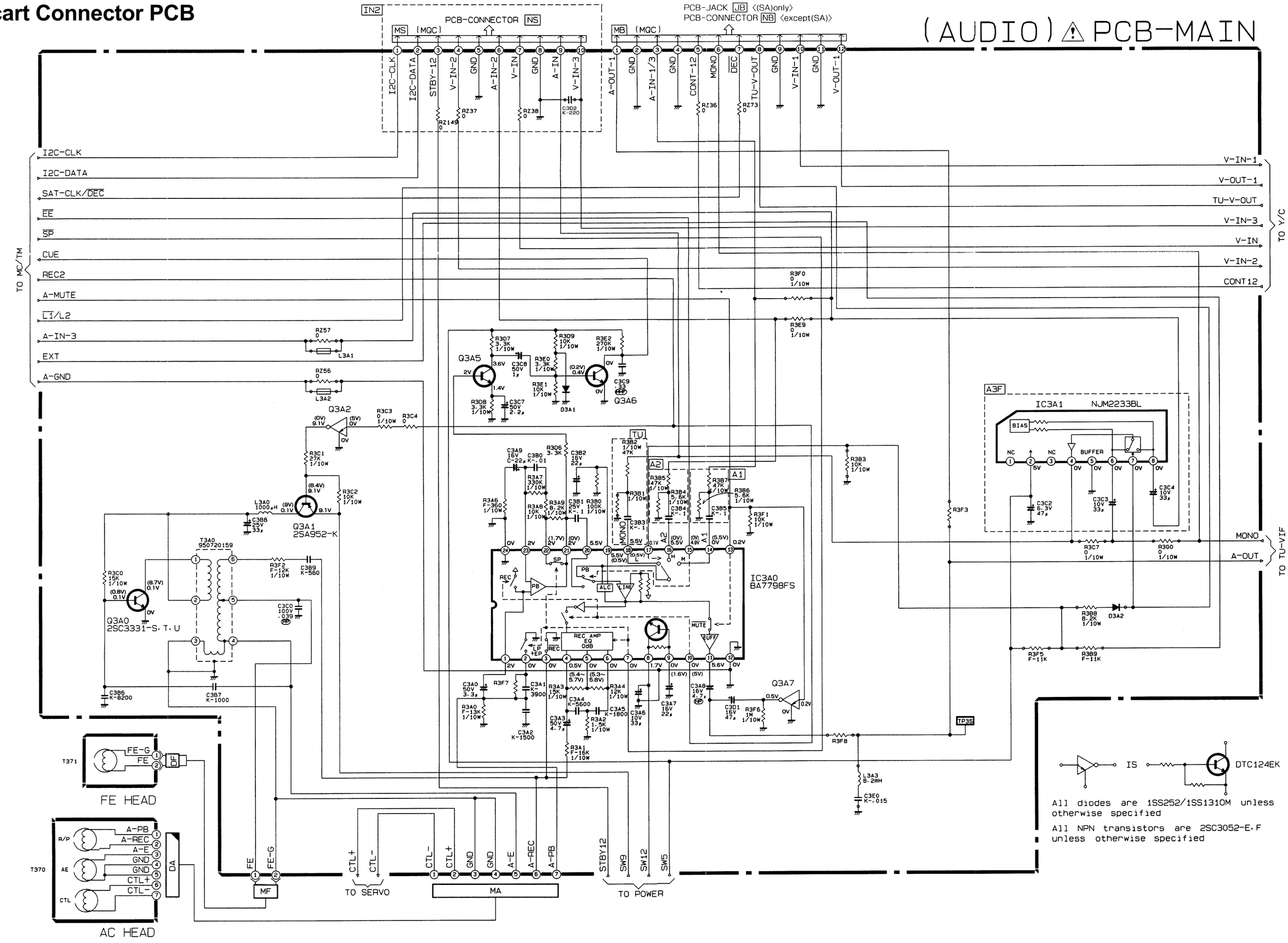


MODEL \ SYMBOL	R215 (D-6)	R209 (D-6)
B, E, IR, SA, A, NZ	1.5K	F-510
G, Y	1.2K	470

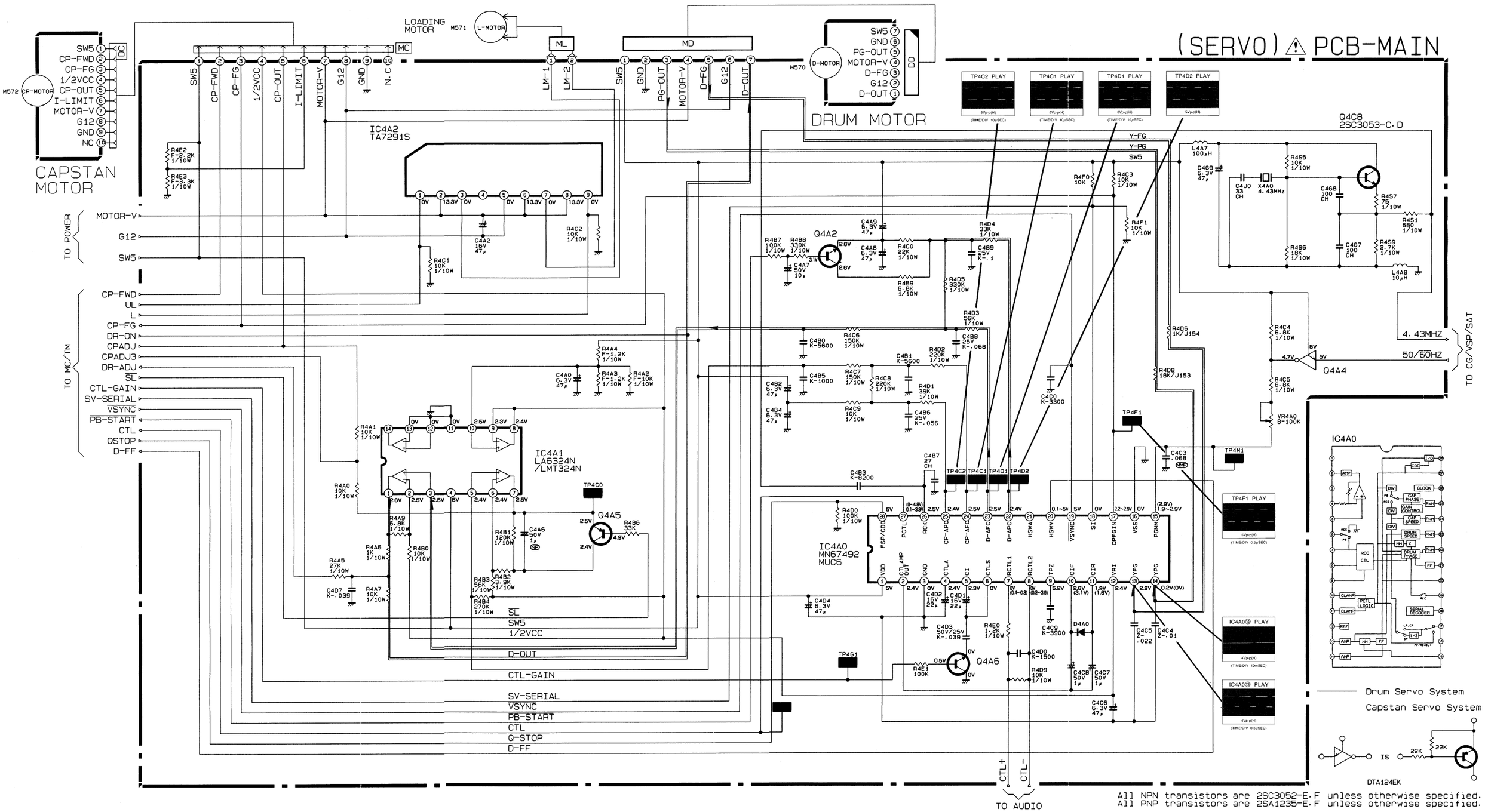
Power Supply Diagram



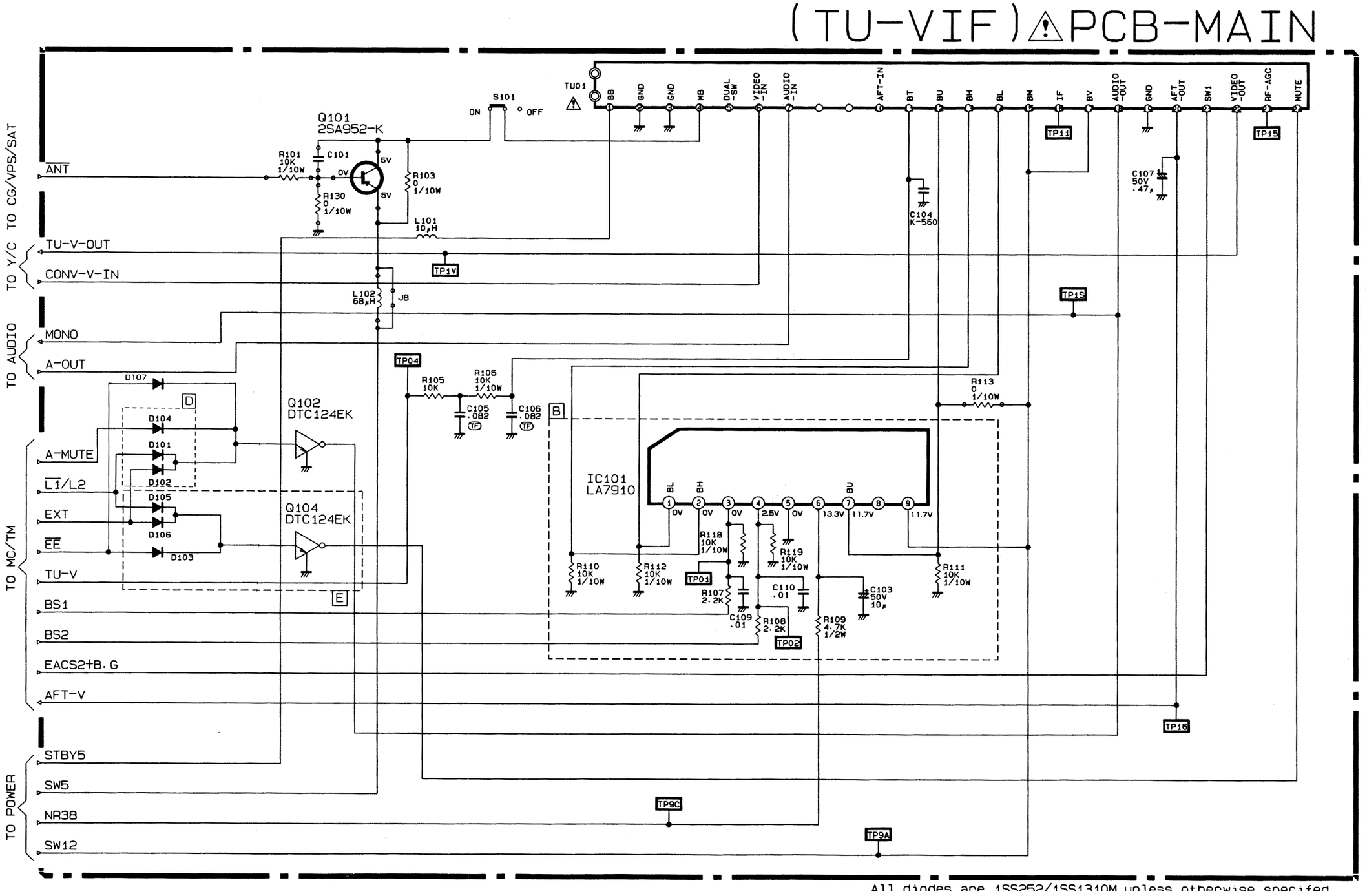
Scart Connector PCB



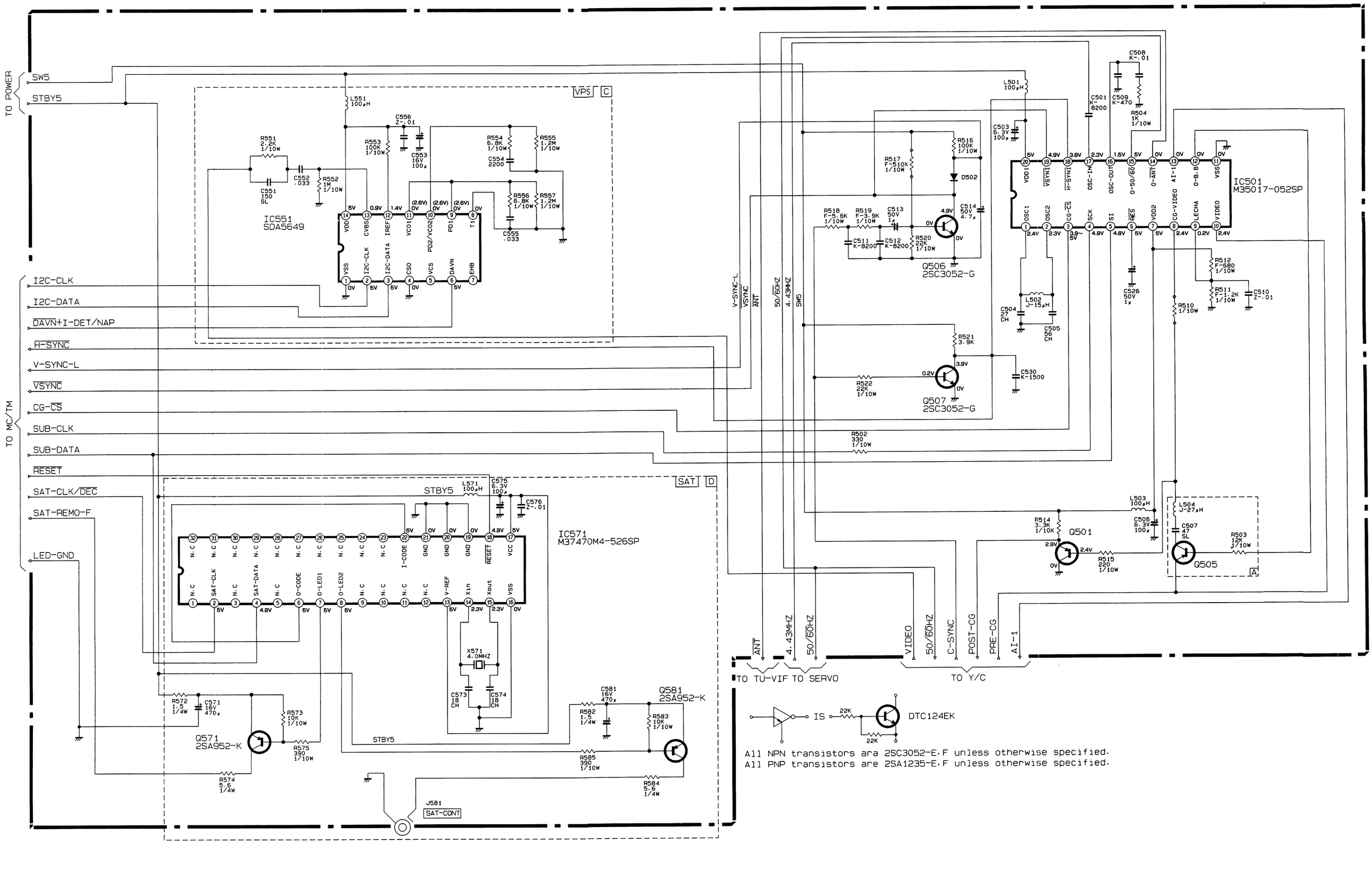
Servo Diagram



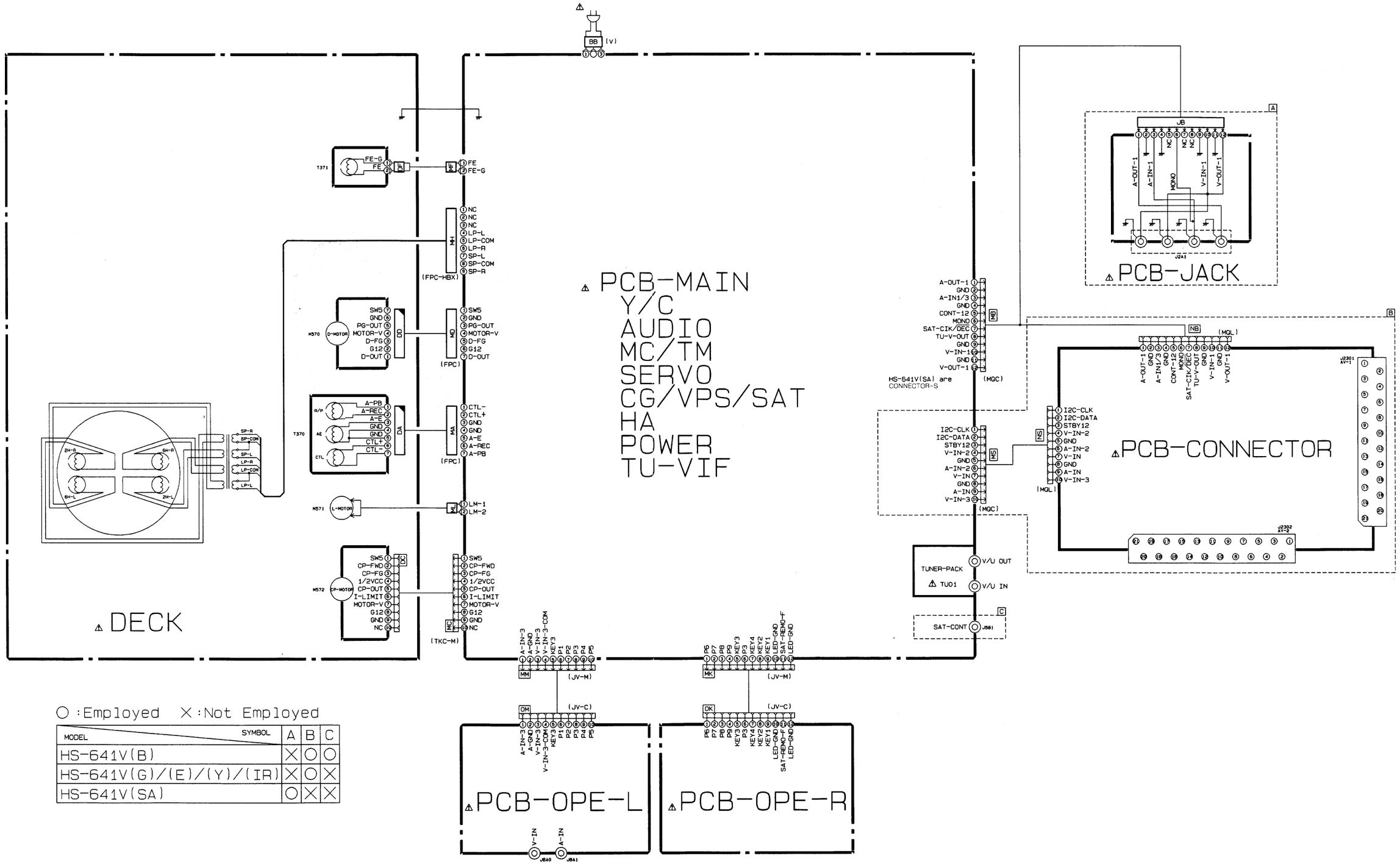
Tuner IF Diagram



VPS/SAT Diagram



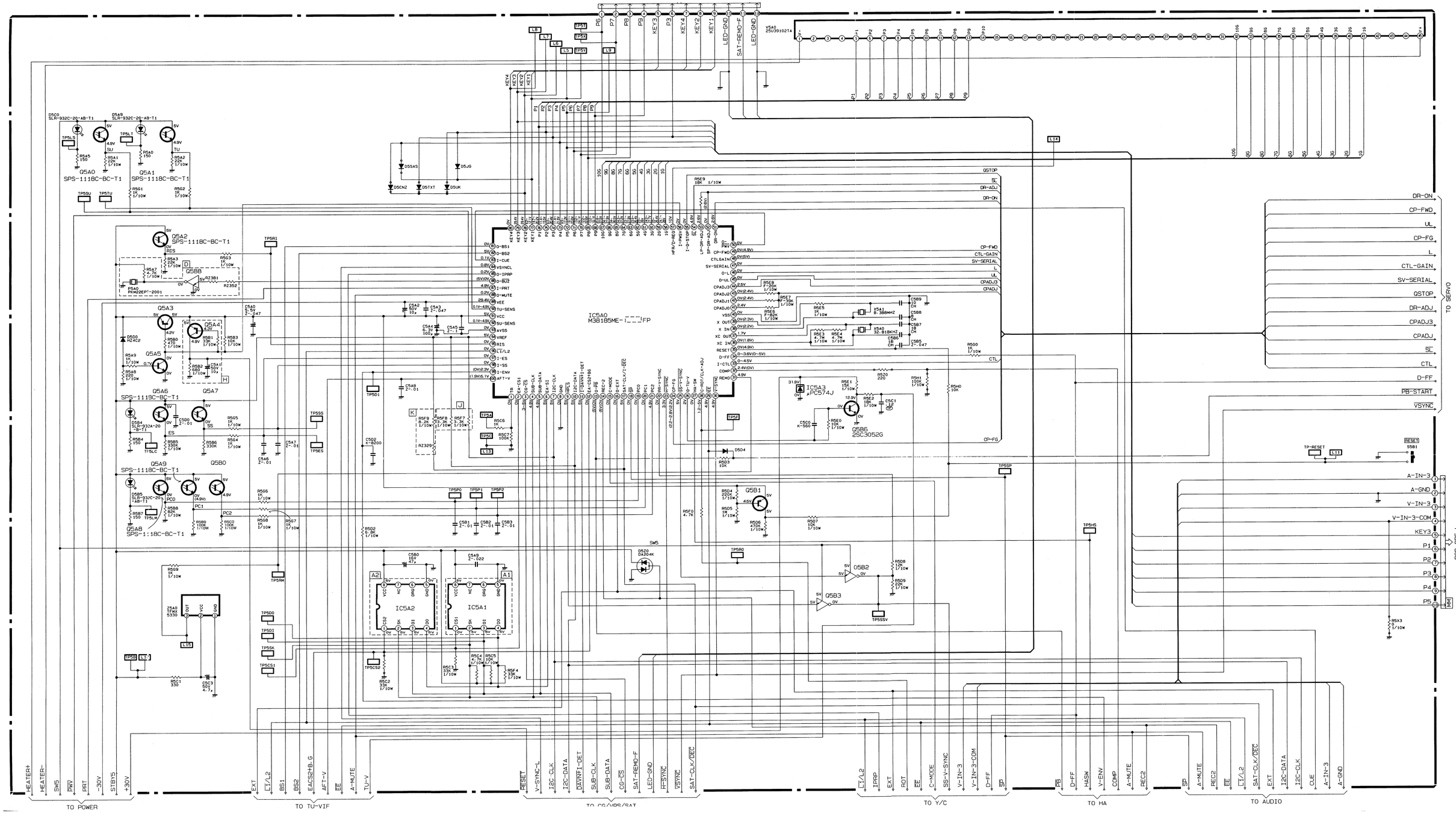
Wiring Diagram



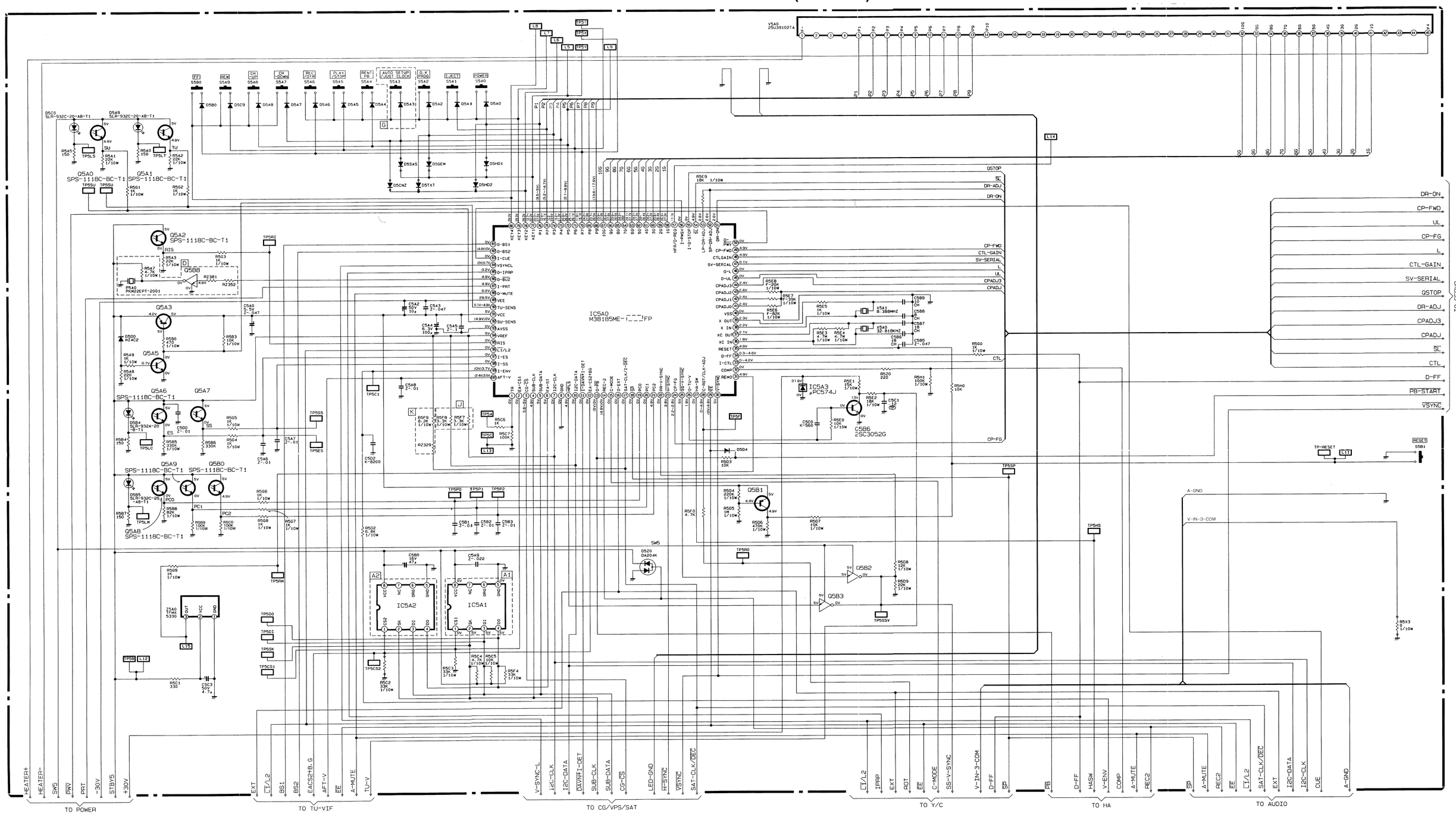
○ :Employed ×:Not Employed

MODEL \ SYMBOL	A	B	C
HS-641V(B)	×	○	○
HS-641V(G)/(E)/(Y)/(IR)	×	○	×
HS-641V(SA)	○	×	×

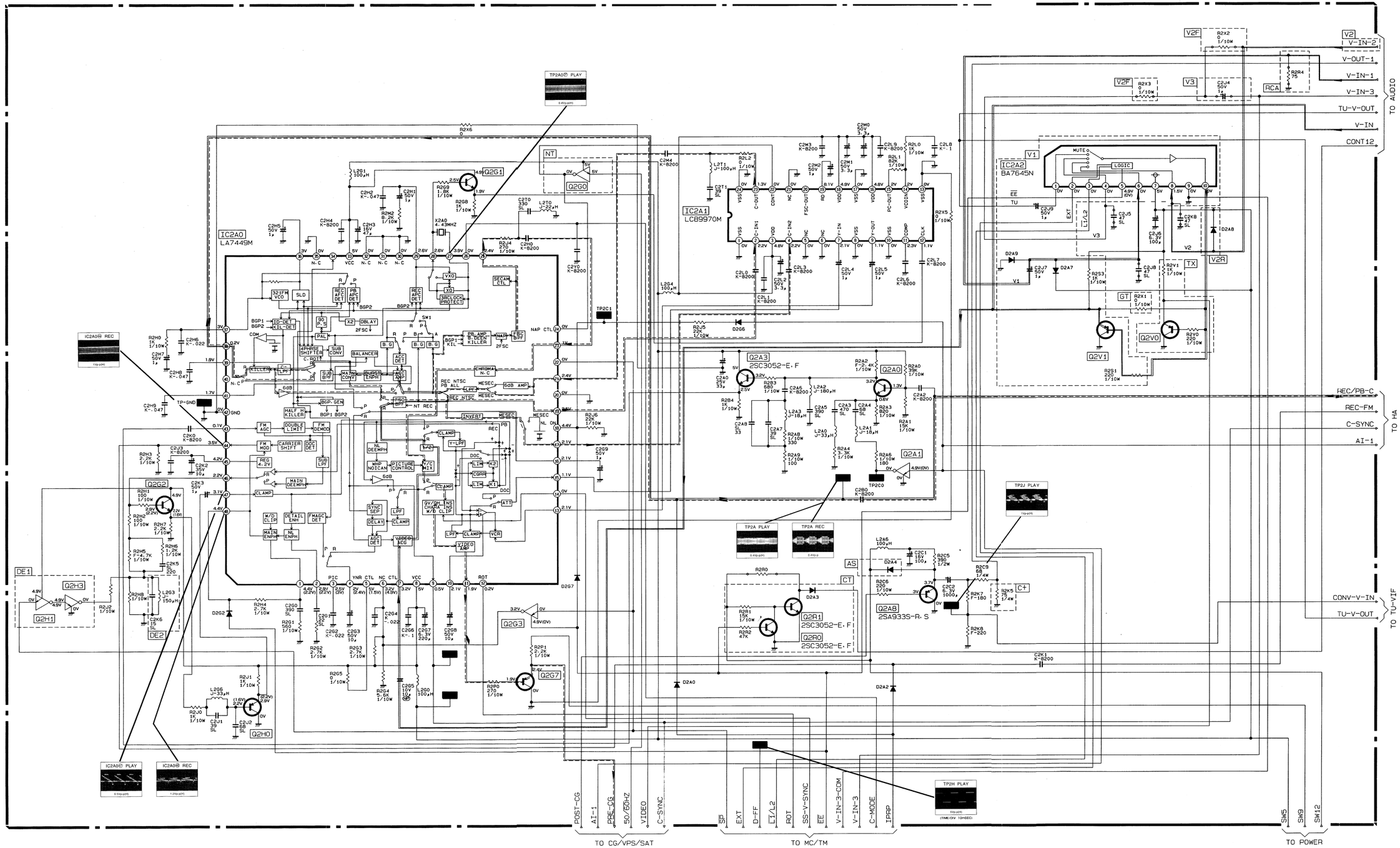
Mechanism Control & Timer (HS-641 V)



Mechanism Control & Timer (HS-640 V)



Y/C Diagram


IC2A0 LA7449M
IC2A1 LC89970M
IC2A2 BA7645N
Q2G1
Q2G0
Q2A3 2SC3052-E.F
Q2A0
Q2A1
Q2H0
Q2H1
Q2H2
Q2H3
Q2G2
Q2G3
Q2G7
Q2R1 2SC3052-E.F
Q2R0 2SC3052-E.F
Q2A8 2SA933S-R.S
Q2V0
Q2V1
TP2A0 PLAY
TP2A0 REC
TP2A PLAY
TP2A REC
TP2J PLAY
TP2H PLAY
TP2C1
TP2C0
IC2A0 PLAY
IC2A0 REC
TP-GND
V2
V-IN-2
V-OUT-1
V-IN-1
V-IN-3
TU-V-OUT
V-IN
CONT12
TO AUDIO
REC/PB-C
REC-FM
C-SYNC
AI-1
TO HA
CONV-V-IN
TU-V-OUT
TO TU-VIF
POST-CG
AI-1
PRE-CG
50/60-HZ
VIDEO
C-SYNC
TO CG/VPS/SAT
SP
EXT
D-FF
L1/L2
ROT
SS-V-SYNC
EE
V-IN-3-COM
V-IN-3
C-MODE
IRRP
TO MC/TM
SW5
SW9
SW12
TO POWER